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ORTHOPEDIC PRINCIPLES IN THE TREATMENT OF ABDOMINAL VISCEROPTOSIS AND CHRONIC INTESTINAL STASIS[1]

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THE justification for the orthopedist having concern with the subject of visceroptosis is to be found in the following facts:

1. Abdominal visceroptosis is invariably associated with disturbances of poise, which must result in weakness of the muscles and strain of the joints. The joint strain is manifested chiefly in the feet, knees, sacroiliac joints and low back, and shoulders. When the congenital type of visceroptosis exists, the disturbance in poise shows even in childhood.

2. The imperfect poise associated with visceroptosis results in a gradual weakening of the trunk muscles, with consequent lessening of this part of the support for the trunk as well as for the viscera.

3. The imperfect poise, commonly showing as the droop of the shoulders and flattening of the chest, must of itself cause downward displacement of the abdominal organs, with possible interference with their function, even though the formation of the organs, together with their ligaments, was wholly normal in the beginning.

4. Many of the chronic joint diseases are probably due to the disturbed physiology resulting from the malposition of the viscera as well as possibly to absorption from the gastro-intestinal tract.

5. Treatment of the joint strains resulting from the postures associated with visceroptosis, as well as the treatment of the joint diseases, due to disturbances of the abdominal viscera, is incomplete, and many times hopeless, unless the viscera are properly treated so that undue strain is relieved and their normal function made possible.

6. The best health and greatest efficiency of the individual is possible only when the body is used in such poise that there is no undue strain or interference with any of the structures.

In the presentation of a paper upon this subject it is hardly necessary before such a gathering as this to enter into the discussion of the different types of visceroptosis more than to mention the fact that there are the two general types, the congenital and the acquired, and that in both of these types will be found many variations in the size, shape, or general formation of the special viscus.[1]

To understand the general principles which underlie the work of the orthopedist it is necessary to know something of that which takes place in the postures assumed in such cases.

When the human figure is held fully erect (Fig. 1.), the chest is raised, the ribs are

[1] L. T. Swaim. Study of Thirty-Nine Cases as Regards Intestinal Length and Nutrition. Boston M. & S. J., Aug. 22, 1912.

[1] Read before the Clinical Congress of Surgeons of North America, New York City, November 13, 1912.

Fig. 1.

flared at the bottom, the diaphragm is high, and there is a very considerable space under the ribs in the abdomen in which the stomach, liver, and spleen lie, almost covered by the lower border of the ribs. Not only is there ample space for these organs, but when these organs are held in place there is ample room for the other viscera in the lower portions of the abdomen. In this position the muscles of the abdomen are contracted so that the abdominal wall is firm and there is the best possible support in the front and sides for the various viscera. Also, in this position, with the abdominal muscles tight and with the abdomen flat, the total depth of the abdominal cavity at the level of the last lumbar vertebra represents only about one third of the full depth of the body (Fig. 2), and this depth is practically the same all the way across, the lateral spinal spaces being filled with the wings of the ilia, the psoas muscles, and the retroperitoneal fat. Above this point the cavity rapidly deepens and the lateral spinal spaces are free for the viscera. The kidneys are almost entirely posterior to the anterior portion of the spine (Fig. 3), while the liver fills much of the lateral spinal space on the right side. If the body is erect the kidneys are so placed in the lateral spinal spaces, surrounded by the retroperitoneal fat (Fig. 4), that their inclination is backward and upward so that there is no tendency to fall forward or sag downward. Also when the body is fully erect the liver is held in place partly by the kidney and the retroperitoneal fat below, but very considerably by the grasp of the lower ribs with the spine (Fig. 5), entirely apart from the support which it receives from the hollow viscera and its suspensory ligaments.

If the body droop (Fig. 6), the shape of the abdominal cavity changes at once. The ribs are necessarily inclined downward, and since the anterior part of the ribs is below the costovertebral articulations, it is inevitable that in the downward movement there is a corresponding backward movement of the anterior portion. This results at once in a material lessening of the space under the ribs, with the effect that the upper abdomen is made much smaller than normal. In this position, since the diaphragm is attached to the anterior portion of the ribs, it must also move downward.

These two elements, the downward movement of the diaphragm and the contracting of the space under the ribs, mean that the liver and the stomach are crowded downward into other positions. In such an attitude not only are the ribs flattened and the diaphragm lowered, but since the support of the body is thrown almost wholly upon the posterior muscles, the abdominal muscles are relaxed. This being the case (Fig. 7), the abdomen protrudes or becomes prominent anteriorly, with the effect that not only is there less support for the organs, but that the depth of the abdominal cavity is materially changed, with the result that all of the organs tend to assume a lower level. In this downward movement or droop of the body, since the posterior attachments of the diaphragm are so low that they come down well behind the upper part of the kidneys, as the diaphragm is

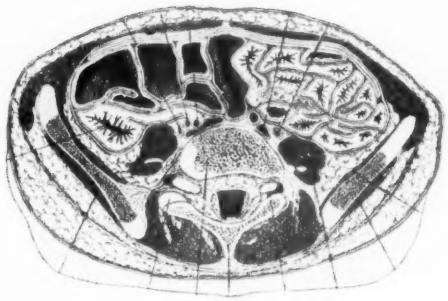

Fig. 2. (Dwight.)

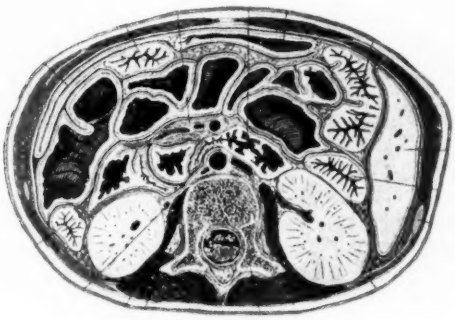

Fig. 3. (Dwight.)

lowered the kidneys are necessarily dragged forward at the top. To still further affect the position of the kidneys, since the liver rests partly upon the right kidney, and since undoubtedly there is some pressure from the stomach upon the left kidney, as these organs are forced downward, the kidneys are forced downward also. The continued pressure of the organs from above upon the kidneys naturally results in the absorption of the fat tissue surrounding them, and this portion of their support is taken away.

In this downward displacement not only are these organs affected, but since the colon, if it has its normal attachment, is attached at the hepatic angle directly under the liver, in the downward displacement, the movable portion of the colon must be forced downward, with the effect that the angle is made sharper and very possibly may be shut off as the result of the force of the downward pressure.

On the left side a similar condition occurs, as the result of the pressure or drag of the stomach against the left side of the transverse colon, with a resulting interference with the lumen at the splenic angle. In this condition also the small intestine assumes a lower level, partly because of the relaxation of the anterior abdominal wall and partly because of the pressure from above.

When the body is fully erect the axis of the abdominal cavity should be almost at a right angle with the axis of the pelvic cavity. In the droop of the body, however, the axes are changed, so that the thrust of the viscera of the abdomen can be received much more directly into the pelvis.

The pressure which such displacement of the intestines must mean upon the organs of the pelvis is perfectly obvious, the possible result being not only interference with the function of the organs by the direct pressure, but by pressure upon the vessels and nerves supplying them.

With such an understanding of the relationship of the organs in the different positions it is at once obvious that if a kidney is sutured in place, and the shape of the body which was responsible for the displacement of the organ is allowed to remain, the result will be most unsatisfactory, the same condition being certain to recur. The same thing is true in regard to the operations which are performed commonly upon the stomach and intestine, which must fail in much of their possibility of benefit unless at the same time the body is remodeled so that the normal relationship of the other parts is restored. It should also be apparent that frequently the fixing of an organ in place makes the adjustment of the organs as a whole more difficult than before. This has been strikingly shown in a case which the writer had great difficulty in relieving, in which the splenic flexure and the hepatic flexure of the colon had been sutured in place in a patient who had had a congenital ptosis with a free mesentery on all the organs. The two fixed points, with the natural drag of

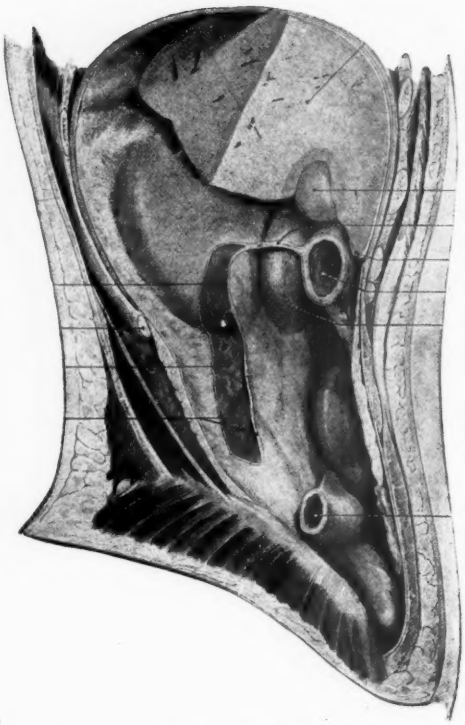

Fig. 4. (Corning.)

all the other loose organs upon these two fixed points, naturally makes greater difficulty in the passage of the waste around these angles than existed before. It is perfectly evident to the writer that many of the cases of surgery and medicine which now represent a reproach to our profession are unsatisfactory because only the purely local element has been appreciated in treatment. If the profession could be made to see that a displaced stomach or a displaced colon or a displaced kidney or the imperfect working of any special organ has its relation to all of the other parts, and should be considered in connection with the other parts, many of the cases which are now perplexing would be easily understood, while many of the cases which are justifiably operable would yield results far different from those now obtained.

Fig. 5. (Sabotta.)

TREATMENT

The ideal which the orthopedist has in the treatment of such conditions is to restore the body as nearly as possible to the normal poise, in which the proper relationship may exist in all its parts. In this he fully appreciates that it is impossible to change the general shape of the special organ or the general character of the ligamentous attachments. In other words, if the congenital type exists, that type must always exist. He appreciates, however, that the best function of an imperfect organ,

Fig. 6. Typical attitude of congenital visceral ptosis. Note the downward inclination of the ribs, the backward inclination of the body from the hips.

Fig. 7. Attitude, congenital visceral ptosis. More extreme than Fig. 6. Note downward inclination of the ribs, backward inclination of the body, narrowing of the upper abdomen, prominence of the lower abdomen.

Fig. 8. Same patient as Fig. 6. Photograph taken four months later. Note the width of the lower part of the thorax, the ribs having been raised as the result of treatment. To the lower part of the brace an abdominal pad is attached to give support over the lower abdomen.

as well as the best function of a perfect organ, cannot take place unless all acquired or unnecessary interference is removed. It is well known to those who have given special study to this subject that even when the congenital type exists, these patients rarely have symptoms in early life indicative of visceral disturbance. The symptoms which have developed later are undoubtedly due to the increase of the downward displacement of the organ or the peculiarity in its formation which must come from the long continued use of the body in the upright position. Since Nature's plan is to repair damage, it is reasonable to expect that the relief of the strain, which resulted in such symptoms, will be followed by improvement, with the retraction of the visceral ligaments, exactly the same as takes place in a relaxed joint with the removal of strain.

It is felt by the writer, both from general reasoning as well as from extensive experience, that a good prognosis is usually possible in such conditions if the acquired features of disturbance of poise and visceral sag can be overcome.

The correction of the poise or the remodelling of the body is at times comparatively simple and can be accomplished by the use of simple apparatus and special exercises without

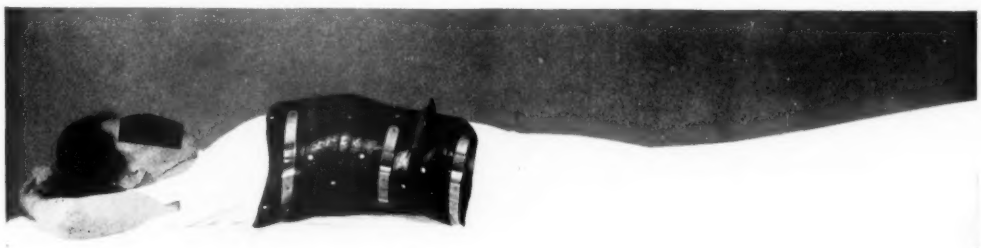

Fig. 9. Same patient as Figs. 6 and 7, showing the jacket with the body hyperextended, the ribs raised to their maximun. This position was impossible in the beginning and was accomplished by several different jackets.

Fig. 10. The hyperextended position. Note the position of the pillow at the dorsolumbar juncture, with the marked prominence of the anterior portion of the lower ribs.

interfering with the active life of the individual, but at other times the condition is so severe that more radical measures are necessary.

Whenever the disturbance of poise in such cases has been long existent not only is the relationship between the bones changed, but there is a marked change in the muscle tone of the body. The anterior muscles of the trunk weaken as the result of disuse, since in this position the strain is thrown almost wholly upon the muscles of the back, with the result that there is a gradual weakening of these back muscles. To attempt to improve the position of the body by exercises alone with such a muscular condition present means increasing the muscle weakness, with a distinct interference with the general recovery. The first step, therefore, is to rest the parts which have been overstrained and to stimulate the parts which have been weakened from disuse. This at times can be accomplished by the use of a brace (Fig. 8), which not only has for its purpose the relief of the strain to the spinal muscles, but also the correction of the poise, the elevation of the chest, the forcing of the lower ribs forward and upward, and furnishing support for the pelvis and the lower part of the abdomen. While this apparatus is being worn, massage, stimulating bathing, etc., are all of advantage in hastening the repair. As soon as the evidences of muscle fatigue have passed, active exercises should be started with the idea of gradually strength-

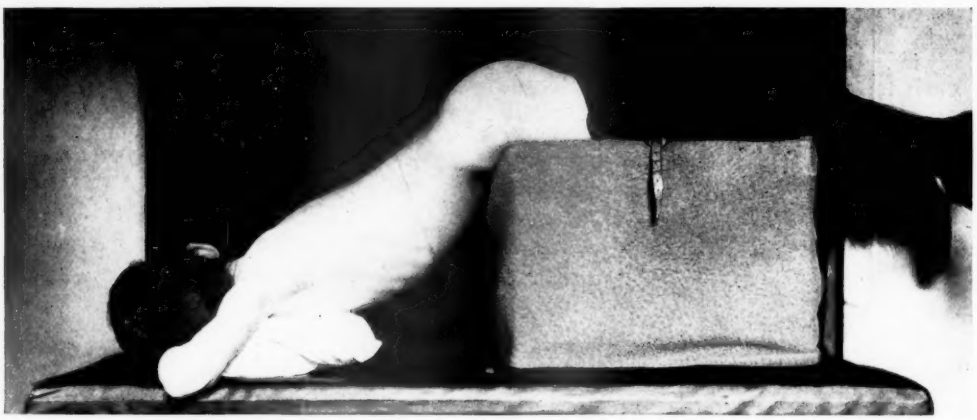

Fig. 11. The prone hanging position.

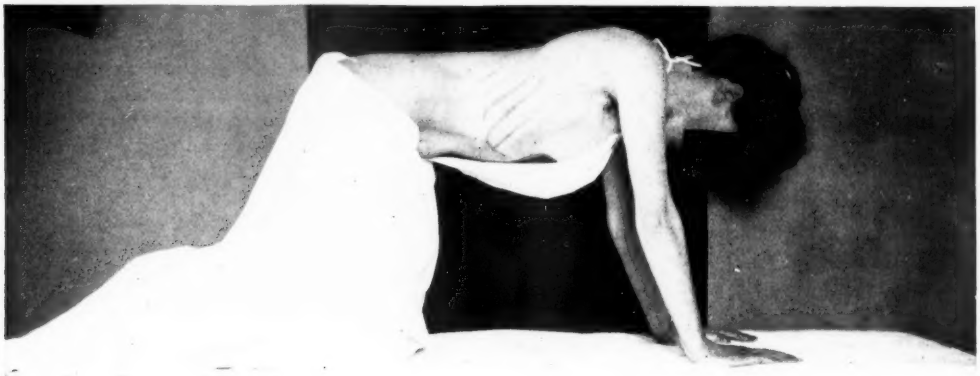

Fig. 12. The same patient as Fig. 6, taken before treatment was started, showing the marked hollow in the lumbar region, due to the absence of the retroperitoneal fat. Also note the change in the position of the ribs brought about by simply assuming this posture.

ening all the muscles of the trunk so that ultimately the poise of the body can be maintained without artificial aid. The brace at such times is gradually omitted, the pelvic belts and lighter supports being substituted for varying periods.

In the severer cases recumbency is absolutely necessary, and since in such cases considerable visceral disturbance may take place as the result of the recumbent posture, care must be taken that the body is so held that this tendency is made as little as possible. The common experience that the nights are times of much distress, with disturbed sleep, much gas in the bowel, abdominal pain, the dragged feeling in the morning, with the weak pulse and the subnormal temperature, finds explanation if the anatomic formation is considered.

To prevent the sag of the organs which must occur as the muscle reflexes disappear in sleep, a leather jacket should be used which is molded from a cast of the body taken when the body is fully extended and with the ribs fully raised. Such a jacket (Fig. 9) is worn during the night, and in such a jacket the patient is allowed to move about or change from back to side or face at will, knowing that whatever position is assumed, harmful interference with the viscera is reduced to the minimum. The quality of the sleep resulting from such support is at times in striking contrast to the quality existing before the apparatus was applied.

In the severe cases recumbency is insisted upon both day and night at times for periods of many weeks, this being necessary partly because of the faulty position of the ribs, with the retraction of the ligaments at both the costovertebral and vertebral articulations. With the body horizontal, the downward sag of the organs is naturally relieved, but it must be remembered that sag in other directions may be quite as harmful in the function of the organs as occurs when the patient is erect. The attacks of vomiting when the patient is kept for long upon the back, with the many and irregular painful abdominal conditions, usually find an anatomic explanation and are usually relieved by change of posture. The position insisted upon in the daytime is with the patient upon a flat bed, with not more than one pillow under the head, preferably none at all, with a small pillow under the back to prevent the backward sag of the lumbar spine, or with the jacket above described, with frequent changes of position to the side or face. Occasionally the foot of the bed is raised to still further assist gravity in the replacement of the organs. The hyperextended position (Fig. 10), in which the diaphragm is raised to the extreme, should be taken for at least a half hour after each of the meals, when the stomachic digestion is

Fig. 13. The same patient as Fig. 6, showing the posture four months after the beginning of the treatment. The patient still wearing the brace, over which is fitted a proper corset, the corset making firm pressure over the lower part of the abdomen, but leaving the upper abdomen and lower ribs entirely free.

most active. Besides this, either the knee-chest position or the prone hanging position (Fig. 11), should be taken at intervals, not only to raise the diaphragm and elevate the ribs, but also to allow the abdominal organs to sag into the upper part of the abdomen. If the stomach has had difficulty in discharging its contents into the duodenum, because of its low position, not infrequently the mere assuming of the knee-chest position or the prone hanging position is sufficient to relieve the difficulty. Not only is this true, but usually such positions are followed by improvement in the function of the intestine, so that not only is that part of the digestion carried on better, but the interference with the movement of the bowel is markedly lessened.

In such cases, as part of the bad postures, the ribs are narrowed at the bottom, producing an acute angle at the border of the costal cartilages. The recumbent position and the special positions with the apparatus should be continued until the lower ribs have not only been raised, but until they have flared sufficiently to change the costal angle from an acute angle to at least a right angle, if not an obtuse angle. This at once assures the space in the upper abdomen under the ribs in which normally the stomach and liver lie.

The recumbent treatment should be maintained also until the general nutrition of the body has improved sufficiently for the retroperitoneal fat, which is almost entirely lacking (Fig. 12) in the extreme cases of the congenital ptosis, to be replaced. This can easily be determined by palpation through from front to back in the loin and over the lateral spinal spaces.

When it is considered wise for the patient to go about, a brace (Fig. 8) is worn at first, and if the patient is a woman, over this a carefully fitted corset (Fig. 13) is also worn. Special exercises are given for the purpose of increasing the muscle tone, and as the strength increases the brace is omitted, the pelvic belt with low abdominal support being substituted. With women this is needed for only a few weeks, after which a corset fitted to give firm support over the pelvis and low abdomen, with no constriction of the upper abdomen or low ribs, is all that is required. With men, the pelvic belt should be worn until the muscles are fully strong and the understanding of the correct poise is so perfect that there is no tendency to acquire the bad postures.

Supervision of such a case should naturally be continued at intervals for a long time for the purpose of preventing relapses. The Patients should be made to understand the harm of badly fitted costumes and the great care that should be taken at all times to see that, whatever the occupation, the body is not allowed to flex "in the middle," the bending which may be necessary being at the hips, the trunk as a whole being kept straight.

If such an understanding of the subject is held, the writer feels that not only is the prognosis good in many of these cases now considered hopeless, but that such understanding offers opportunities of team work between the physician, the surgeon, and the orthopedist that shows our profession at its best.

THE THYROID AND PARATHYROID PROBLEM[1]

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THOUGH there has been a great deal of progress made during recent years in the thyroid and parathyroid problem, the time has not yet arrived when positive statements can be made with reference to all of the phases of the question. In spite of the fact that large numbers of cases of goiter are being treated surgically with more or less beneficial results, it seems quite safe to predict that the ultimate solution of the problem has not been reached. Furthermore, during the last five years, owing to the many reports of experimental work in the case of the parathyroids, these glandules have occupied the attention of surgeons and others possibly too much.

Regarding the etiology of enlargement of perverted secretion of the thyroid gland we are still in doubt. Probably the most direct evidence during recent years is that given us by Chambers (1) and McCarrison (2). Before the British Medical Association, Chambers reported as follows: "Many attempts have been made to find evidence of organism infection. Several hundred sections have been made in some cases, and have been treated by various methods for showing organisms in tissues. Bacteriological examination, including animal inoculation, has been made in a few cases. The results have been entirely negative. Nevertheless, the histological characters suggest a toxic substance present in the thyroid gland — in some cases diffuse, in others localized. As to the nature and origin of this substance, we are at present entirely in the dark."

In 1909 McCarrison reported his work in India. Water from a known goitrous well was filtered through a Berkfelt house filter. The filtrate was given in quantities of four ounces in milk each morning before breakfast to six healthy young men between 18 and 20 years of age. During the experiments all six were kept under the closest observation in order to avoid errors. Five of these developed goiter, and one of them was subsequently cured by means of thymol. McCarrison himself was the subject of the next experiment. He had resided in a goitrous district for five years without any enlargement of the thyroid gland. Water for his house was obtained from a well notorious as a non-goiter-producing water. Care had been taken by all Europeans to avoid the disease. Each morning before breakfast, during the experiment, he consumed half a tumblerful of the Kashrote water suspended matter, prepared in the same way as in the preceding experiment. At the end of fifteen days the neck had increased 2 cm. in size, and there was found to be uniform enlargement of the thyroid gland. The experiment was continued nine days longer, during which time the gland fluctuated somewhat in size. At one time he was hardly aware of the presence of the enlargement, while at another, and especially at night, it gave him distinct discomfort.

Following this experiment, McCarrison next boiled the water and repeated the experiments both on himself and seven other men, with entirely negative results. He then concludes that goiter is due to matter suspended in water, and that this matter is not mineral but a living organism. Moreover, McCarrison adds additional color to his theory that thyroid in his district is due to an infection, because he reports 68 cases of goiter cured by the administration of thymol. "The main action of this drug," he says, "is a local one in the intestine, owing to the fact that in the absence of oil, alcohol, or other of its solvents it is very sparingly absorbed. Its curative action is very strong, though not conclusive, evidence that the habitat in man of the organism responsible for the production of goiter is the intestinal tract." He goes on to say that "further evidence on the point is afforded by the differential blood counts in cases of the disease. I have found eosinophilia of 8.9 per cent as an average of sixty-

[1] Read before the British Columbia Medical Association, at Victoria, August 20, 1912.

five cases which I have examined by this method."

Short (3) does not agree, however, that such evidence as this points strongly in favor of infection. He says, "It is quite in accordance with the common laws of nature to find a metal or mineral specially limited to a particular geological formation in widely separated areas, but there is no evidence that bacteria are dependent on geology; and it has recently been shown by numerous observers that the waters of a goiter well retain their power to cause goiter in rats after filtering out all bacteria by a Berkfelt filter, but not after heating to 80° C. The heating probably precipitates the metal as an insoluble carbonate, by driving off the carbon dioxide, which it holds in solution."

Thus, Short rather holds the view that goitrous water owes its goiter-producing qualities to minute traces of some metal having a great affinity for iodine, and forming with it an insoluble compound.

As was intimated at the commencement of this paper, the thyroid problem is intricately woven into the parathyroid problem. Despite the positive statements of many experimenters, voiced by Tuholske (4), who says the generally accepted view is that "After the removal of the thyroid gland the parathyroids never change structurally, never get like, never resemble thyroid tissue, and never assume its functions," it would seem wise to withhold judgment before accepting such positive views. Thompson and myself (5) showed a series of illustrations in which the thyroid after parathyroidectomy closely approximated the histological structure of the parathyroid after thyroidectomy. That is to say, after the parathyroids are removed the thyroid is changed in histological appearance to be somewhat intermediate between normal thyroid and parathyroid. Similarly, the parathyroid, after thyroidectomy, loses its typical appearance, and in place of the solid columns forming the normal parathyroid, definite vesicles appear, some of which contain colloid material. There is marked hypertrophy of the whole gland as well.

Furthermore, the question becomes more complicated still, for evidence is at hand to show that probably the pituitary gland and the thyroid may act vicariously for one another, or at least that they may have a function more or less common to one another. As Short says, "Oversecretion of the pituitary gland, as we shall see, results in overgrowth of the bones, and may lead to gigantism. On the other hand, inadequate thyroid secretion will stunt the growth of bones, as is seen in cretinism." In addition to this clinical evidence, histological changes observed also give even stronger evidence. After thyroidectomy in rabbits, Herring (6) reported as follows: "Remarkable changes are at once apparent in the posterior lobe of the pituitary gland, and particularly that portion of it which lies next to the pars intermedia. Masses of a colloid nature lie among the cells and fibers of the pars nervosa. In the neck of the posterior lobe the colloid is even more plentiful."

Rogowitsch (7), Vasalle and Generali (8), and Edmunds (9) also found that the pituitary acts vicariously for the thyroid.

In work recorded elsewhere the author (10) reported changes found in the pituitary of a dog after parathyroidectomy. In this case the animal lived till the thirty-third day and died in convulsions. The pars intermedia of the pituitary gland showed distinct and numerous vesicles which histologically resembled normal thyroid. The vesicles were lined with a regular circle of epithelial cells precisely as in the thyroid; the colloid contents seemed to be of the same character as in the thyroid.

Thus we see that there is considerable evidence to show that the thyroid, the parathyroids, and the pituitary gland have some features in common, and that they may to some extent act each for the other. And the problem becomes even more complex when we view the research work of the various investigators. Rogers makes out a strong case in favor of an intimate relationship, both physiological and pathological, between the thyroid, the pancreas, and the adrenals. His experiments and his interpretation of them are very convincing. From his findings he seems quite justified when he says, "Apparently goiter or symptoms referable to the thyroid may occasionally be entirely secondary to

other disturbances, and the superficial deformity seems often to be only a hypertrophy which is compensatory to a failure elsewhere."

Even with this evidence all before us we are compelled to admit that much still remains to be learned about these glands. Though this uncertainty is very disquieting from a clinical standpoint, it is wise for us as surgeons to refrain from allowing ourselves to dogmatize to such an extent that our surgical treatment is based on errors etiological, physiological, and pathological.

It is assumed by most writers that exophthalmic goiter is due to a hypersecretion of the thyroid gland. This view is probably correct; nevertheless, our knowledge of the internal secretion of this gland is still very deficient. The exceedingly careful article of Carlson and Woelfel (11) on this subject tends to emphasize the paucity of definite facts. They have shown that the lymph production in the normal thyroid is slight, and that it is increased in all types of enlargement of the gland. They state, however, that there is no relation between the iodine content of the gland and the lymph production. Furthermore, they were unable to find any difference between the common neck lymph and the lymph of goiter, except that the latter contains pure lymphocytes. They made chemical tests for iodine in the thyroid lymph with negative results; intravenous injections of thyroid lymph in dogs, both with and without anæsthesia, produced negative results. Complete elimination of the thyroid and parathyroid lymph for forty-eight hours in normal foxes gave negative results. The whole rôle played by iodine is still an open question. They conclude their article with this paragraph:

"We have as yet no undoubted or adequate test for the thyroid-parathyroid secretions in the body fluids. When such tests are discovered, it will in all probability be found, in view of what is now known concerning the distribution and paths of all their internal secretions, that these secretions are more concentrated in the blood than in the lymphs, and that they enter the blood directly, rather than indirectly through the gland lymphatics."

Another method of approach, of course, is the one adopted by Reid Hunt (12) and many others, viz.: a chemical analysis of freshly removed glands. The majority of these observers have directed their attention to a determination of the iodine content of the thyroid gland in health and disease. The most recent and correct determination is possibly that of Riggs (13). He found on an average 0.3 mg. of iodine per grain of the gland substance. In the thyroid of Graves' disease, however, this is decreased to 0.2 mg., or even less than 0.1 mg., and the less iodine per grain of the gland, the more severe the symptoms are, as a rule.

Rogers' analysis of the gland has been undertaken from a different viewpoint. He has been able to isolate two entirely different substances, each more or less free from the other. One of these he terms a "nucleoproteid," which he supposes represents the epithelial portion of the gland. The other he terms "globulin," which represents the colloid. Regarding the action of these two substances there seems to be very marked physiological differences shown between them. If ten to fifteen minims of a 1:1000 solution of the human thyroid nucleoproteid is injected subcutaneously into a normal individual at intervals of a couple of hours, it invariably and soon produces tachycardia, accelerated respiration, cutaneous flushing, slight elevation of temperature with a subjective feeling of heat, sweating, tremor, insomnia, and a sensation of nervousness. When thyroid globulin is injected subcutaneously into a normal individual in the same dosage as the nucleoproteid, there seems to be little or no effect except a feeling of well-being, and a very large amount must be administered and for a much longer time, to obtain the characteristic signs of thyroidism.

This faithful attempt at a complete analysis will, as Ochsner (15) says, no doubt lead ultimately to a complete knowledge of the chemical and physiological features of the thyroid secretion. In view of these findings it would seem well, for the present, to still hold open minds as to whether there is a hypersecretion or a perverted secretion. True, the numerous pathological reports such as Wilson's (16) regarding the reduplication of the basement membrane in the vesicles in the

gland, with the accompanying change in the epithelium found in exophthalmic goiter, suggest increased or hypersecretion, also the known beneficial results in partial thyroidectomy suggest the same answer. Still, until we have some definite demonstration of the secretion itself and of the increased amount secreted in Graves' disease, we cannot hold the problem to be settled.

Again, the complexity of the relationship existing between Graves' disease and myxœdema tends rather to cast doubt over the generally accepted theory rather than to clear the situation. True, myxœdema occurs in the absence of the thyroid gland. In 408 cases in Kocher's clinic, complete extirpation of the gland was followed by myxœdema in 69 cases. Experimentally Horsley (17) and Edmunds (18) claim to have produced mild myxœdema in monkeys. Munk (19) and Vincent and Jolly (20), however, were unable to confirm these findings. Gunn and myself (21) also reported elsewhere a series of experiments on the monkey with negative results.

Clinically, many factors are thought to have a bearing on the production of goiter. Temporary enlargement of the thyroid is known to occur during menstruation and pregnancy. Stengel (14) also points out that tremor, palpitation, rapidity of heart action, and fullness of eyes occuring occasionally in anæmia are due to hyperthyroidism. He thinks this is true also of certain circulatory disturbances and also certain nervous conditions. In Graves' disease fright is held to be a common cause. A review of the various causes assigned, from a clinical standpoint, would probably be merely a recital of occasions when an already existing Graves' disease became so aggravated that the patient's attention was directed to it or a simple goiter took on the graver form. It would be well for us in taking the histories of our cases to keep this point in mind.

TREATMENT

Amongst the various forms of treatment at the present time, the most spectacular is removal of part of the gland. Various forms of medical treatment are recommended and they are chiefly directed toward counteracting or eliminating the supposed excessive secretion. Various forms of diet are also prescribed with the object of decreasing the secretion. One is probably right in stating that at the present time the chief drug which seems to have directly beneficial effects is quinine hydrobromate. X-ray, radium, injections of boiled water, and carbolic acid also have their enthusiastic advocates. These, however, are established on an entirely empirical basis. McCarrison's administration of thymol, however, is based on what to himself seems a rational foundation—that goiter, as he finds it in India, is due to a micro-organism.

The administration of iodine and the commercial preparation of thyroid extract is, in the light of our present knowledge, not to be recommended, though it may be ultimately proven that the primary enlargement of the thyroid gland in many cases is due to the effort of the gland to gather more iodine from the blood. It does not follow from clinical experience that the administration of iodine is beneficial. Thyroid extract, if it contains all the essentials of the gland, can only be useful after the case has passed over from being one of Grave's disease to the condition of myxœdema.

The most rational treatment, possibly, which has been presented so far is the subcutaneous injection of Rogers' serum. This observer seems fairly justified when in refering to this treatment, he says: "This serum seems as specific and beneficial in its effects on the symptoms of acute toxæmic thyroidism as is the antitoxin on those of diphtheria; but the convalescence is protracted, and after the subsidence of the acute symptoms the antithyroid serum must not be 'pushed' unduly. In acute exacerbations of chronic thyroidism it must be used with caution, and not beyond the period at which it seems beneficial. In the usual chronic case of exophthalmic goiter, except when the blood pressure is high or above 150 mm. of hg., it is slowly beneficial, and often curative when administered at intervals of two or three days and continued for weeks or months. It cannot with safety be administered oftener than once in twenty-four hours, and if at any time at the end of two or three days it has intensified

rather than alleviated symptoms it should be stopped."

During recent years, in the surgical treatment of goiter, particularly of the exophthalmic variety, the chief advances have probably been made by Crile (22) of Cleveland and Dunhill (23) of Melbourne. The most painstaking and exhaustive work by Crile and his associates has shown that the elimination of fear by the administration of morphin and scopolamin prior to the giving of the general anæsthetic has reduced in their hands the number of devitalized brain cells very materially. The use of nitrous oxide in place of ether has also reduced the devitalized cells to one quarter. This work is recorded from their experimental laboratory. Crile's now famous method of anæsthetizing the patient with Graves' disease in such a way that the patient does not know that the anæsthetic is being given has been a great advance. The use of nitrous oxide in place of ether is also undoubtedly of immense value.

Dunhill's work is probably the most remarkable ever recorded. He does not use a general anæsthetic. Local anæsthesia is gained by using seven ounces of 2:1000 novocain. With this all the tissues of the front of the neck are well infiltrated. The most remarkable feature about his work, however, is that he operates on cases showing the most advanced muscular changes, including very badly weakened hearts. In fact he refuses practically no cases. He emphasizes particularly the need for operating gently, without any crushing of the tissues. Keeping in mind the fact that he refuses practically no case, his operative results are indeed remarkable. He had four deaths in 380 operations of all classes, of these 230 being of the exophthalmic variety.

The value of ligation of the vessels of the thyroid gland without removal of the latter has clinical evidence to support it.

In conclusion, one is compelled to admit that there is still a very great deal to be learned. The relationship between the thyroid and parathyroid glands and other of the ductless glands is still one of the unsolved physiological problems. Clinical knowledge has made some advances, but after many gropings in the dark, many steps thought to be thoroughly scientific have been taken on some false assumption or some premature experimental finding thought at first well-founded. However, in spite of our lack of knowledge on many points, clinically, we know that perfect rest of body and mind is of great value. This, of course, merely gives the patient a chance to cure himself, and after all, that is exactly what modern treatment does in the major part of tuberculous conditions.

The surgical treatment of goiter, both of the simple and exophthalmic varieties, in the light of clinical evidence chiefly, is appropriate in many cases. Rogers' serum ranks as one of the greatest advances. However, even in the hands of its originators it has not fulfilled expectations. It has a field to fill, and that field has not yet been defined clinically. We must look for further light before its use can be considered specific.

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CHRONIC INTESTINAL STASIS[1]

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THE subject of chronic intestinal stasis which has been chosen as the basis of this discussion, is one in which I have been intensely interested for many years. When I first began to draw the attention of the profession to the great part played in the life history of the individual by a delay in the passage of material along the alimentary tract, and drew a parallel between the human digestive canal and a drainage system, my observations were treated as being the fantasies of a vivid imagination. Later, when the accuracy of these observations was being tested in the field of hard fact, the more progressive observers began to realize that my premises were not so fanciful as was at first supposed. Now, the subject of chronic intestinal stasis, and its disastrous sequelæ, is occupying the attention of the profession more completely every year. Those who were inclined to scoff at the suggestion of the need for any operative treatment of such a harmless and everyday condition as simple constipation are now beginning to realize that the operations which I have devised are in reality directed against a most serious condition in which constipation in itself plays but the part of a common and by no means essential symptom. To many members of our profession constipation apparently means merely the absence of a daily action of the bowels, but what I mean by chronic intestinal stasis is an abnormal delay in the transmission of the intestinal contents through some portion or portions of the gastro-intestinal tract, which delay may be accompanied by constipation or by a daily or even more frequent action of the bowels.

What is intestinal stasis from a commonsense point of view, freed from the bias of a creed which has been instilled into us in our medical infancy? The gastro-intestinal tract is a living, sentient, drainage scheme, of which the several portions perform several functions, from which nutrient material is picked up by absorbing vessels, and into which certain organs discharge their contents. In some portions organisms thrive normally, in others the presence of the same organisms produces poisonous products which that segment of the tract is unaccustomed to deal with. These poisons, being absorbed, damage the tissues of the body, causing them to degenerate and reducing their capacity to combat successfully organisms which may invade them. Any delay in the passage of the contents of this drainage scheme has a threefold result on the organisms found in the intestine. Their multiplication is facilitated, they extend beyond the limits of their normal habitat, and extraneous strains are developed. These organisms may extend along the ducts of the organs which open into the drain pipe, and they or their products, carried in the blood stream, may infect organs which do not directly communicate with the intestine, for example, the kidneys.

The excess of these poisons circulating through the body cannot be dealt with effectually by those organs whose business it is to

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render them as innocuous as possible. They produce progressive degenerative changes in every tissue and a very definite and unmistakable series of symptoms results.

The liver and other organs which convert the toxins, the heart and vessels which convey the products of conversion, and the kidneys and organs which eliminate them, all show after a time distinctive evidences of overwork, which, when they produce symptoms, are regarded as separate entities and are called diseases. In common with all the other tissues of the body, these structures suffer from being nourished with more or less impure blood, and their textures are injured in consequence. I need hardly call your attention to the remarkable confirmation of my views which are afforded by Carrel's magnificent work in the growth of tissues. He shows that death of tissues is due to an inability to eliminate waste products and that by draining them effectually and supplying suitable nutrition he gives them immortality.

The changes undergone in intestinal stasis by the ductless glands open up a vast field of interest. The part played in the suprarenal glands for example, assuming that our idea of their function is correct, must be a most important one. Nothing can be more striking than the pigmentation of the skin which occurs in stasis, or its abrupt disappearance when the supply of poison has been stopped. A patient who has been coppery or mahogany colored for years, will resume an appearance of health within a few days of the removal of the large bowel. The comparative rarity of fatal cases of so-called Addison's disease is a striking instance of the capacity of these wonderful little organs to hold their own under difficult conditions. Again what are the mechanics of the general low temperature, which is especially to be noted in the extremities of those patients who are the subjects of chronic intestinal stasis? Is its purely a cardiac matter, or do the ductless glands play an important part?

The rapidity with which this low temperature disappears, and the color and feel of the extremities improve after ileocolostomy, is even more striking than the removal of pigment from the skin, often taking merely a few hours.

We are but touching the fringe of a most important subject, and it is one which the surgeon, if he will cease to be satisfied with treating end results in a routine manner, has more opportunity of elaborating than the physiologist or physician.

The nervous system is also markedly affected in intestinal stasis, and as an illustration of this fact, I would call your attention to the case of a woman suffering from tic douloureux who had been sent to me from South Africa for removal of her Gasserian ganglion. She had suffered severely from this trouble for eight or nine years, and during the last two years her life had been intolerable, in that she experienced constant pain exaggerated by several violent agonizing outbursts during the day. Never having been able to satisfy myself that the excision of this ganglion is a scientific operation, I refused to perform it in the circumstances. I found, and my opinion was supported by the X-ray examination, that she was suffering from marked stasis and she stated that she obtained more relief from purgatives than any other medical treatment. We short-circuited her, and for a week after the operation she continued to have pain in the right side of her face, but without exacerbations. All pain disappeared completely on the eighth day. Excepting that she had a slight attack of pain at the end of the fifth week, her progress was marvelous, in that her general health improved rapidly, her weight increased and a smiling, happy, bright expression replaced one of the most miserable and hopeless imaginable. This case merely shows in an exaggerated manner the effect of autointoxication on the nervous structures, and as I have frequently observed it in a lesser degree and have cured it by removing the stasis, it points again to the fact that it is better and more scientific to treat primary causes than to deal with end results.

Need I remind you of the degenerative changes in the breast associated with stasis, and which disappear if the drainage scheme be properly dealt with, but which if left alone not infrequently terminate in cancer? When I first pointed this out it was ridiculed by a number of surgeons, but I see that it is rapidly

becoming accepted by many observers who have confirmed it by pathological evidence.

There are many other conditions, such as the several changes in the thyroid, which are in my opinion the results of chronic intestinal stasis and which are very possibly in certain stages better treated by removing the primary cause than by dealing with the end results. By doing this not only is a progressive disease cured, but the general nutrition and health of the patient are vastly and steadily improved. I refer here not only to exaphthalmic goiter but also to adenomatous growths in the thyroid.

Such are the results of delay; what then are its causes? Obstruction in the drainage scheme may occur in the first place at the points of normal fixation, or in the second place the intestine may become kinked by acquired bands, etc., which, formed in the first instance by nature with the object of facilitating drainage, may have later come to cause very material obstruction.

There are several sites in the length of the alimentary tract at which this obstruction may occur, and I would first direct your attention to the mode of control of the contents of the duodenum by the kinking which occurs at the junction with the jejunum. It is somewhat difficult to determine what is meant anatomically by the duodenum, since it varies in its arrangement, but I shall regard the first mobile portion of bowel as jejunum. The vertically placed termination of the duodenum is firmly secured to the root of the transverse mesocolon. From this point in normal conditions the jejunum forms a gentle curve allowing of the free passage of the contents of the duodenum into the small bowel. If, however, there be any marked stasis of the contents of the small intestine due to control of the ileal effluent, the commencement of the jejunum is pulled vertically downwards in such a manner that the duodeno-jejunal junction is obstructed by a kinking and also by a twisting of the bowel, and the effluent is controlled proportionately.

If the condition of obstruction be advanced, a new mesentery running from the outer aspect of the jejunum outwards and upwards to the structures in the immediate vicinity is found to have been formed. This mesentery is obviously the crystallization of resistances which tend to support the weight of the jejunum, and by taking that weight directly off the duodeno-jejunal junction, prevents obstruction at that junction as far as possible. While this acquired ligament may be useful in its early stages, it finally opposes the normal functioning of this portion of the intestine much in the same way as does the acquired ligament that forms at the end of the ileum.

In order to obviate the development of this mechanical disability the commencement of the jejunum, by an evolutionary process, becomes attached by peritoneal bands from left to right to the under surface of the transverse mesocolon in such a manner that in its highest state of development the fixed bowel forms an almost complete circle.

Between the normal condition at birth and this high evolutionary type all grades are found, each presenting a varying degree of disability. I have indicated diagrammatically in Fig. A what I believe to be the usual condition at birth; in Fig. B the condition commonly present in advanced duodenal obstruction in chronic intestinal stasis (the arrows indicate the acquired ligament, which represents the crystallization of lines of force, and which is frequently present and which is evolved to take strain off the termination of the fixed bowel); and in Fig. C the fully developed fixation of the jejunum to the under surface of the transverse mesocolon. The arrows in this diagram indicate the acquired mesenteric bands which are evolved to fix the bowel in this situation in order to obviate angulation at its termination and consequent interference with the effluent. The advantageous mechanical arrangement afforded by this last type may be imitated by suturing the jejunum to the under surface of the transverse mesocolon after the division of any such bands as are shown in Fig. B should they exist. It would seem impossible to eradicate from some minds the idea that these acquired bands and mesenteries are inflammatory in origin.

We see, therefore, that nature recognizes the advantages of a fixation of the first part of the jejunum to the under surface of the transverse

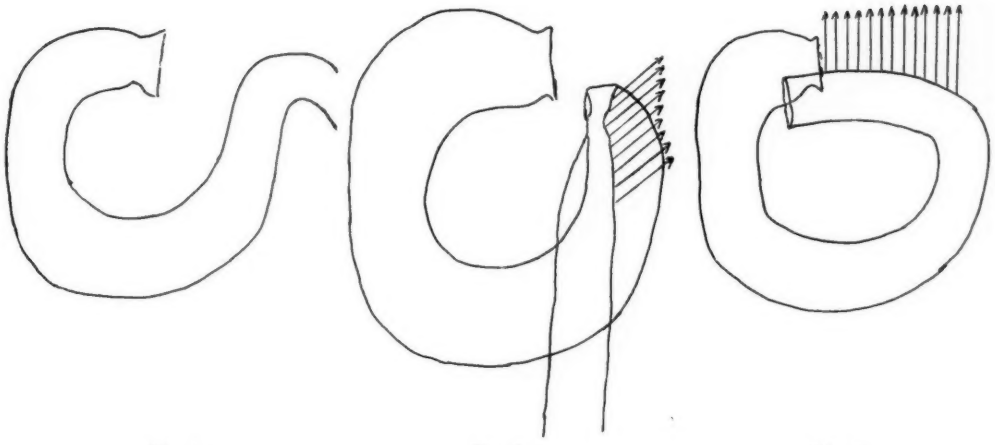

Fig. A. Fig. B. Fig. C.

mesocolon so that it lies at right angles to the termination of the duodenum. This rectangular fixation tends to obviate kinking at the duodeno-jejunal junction. The surgeon unconsciously brings about the same effect by his operation of gastro-enterostomy.

The temporary relief that follows this operation when performed for ulcer of the duodenum is thus explained, since whether an anterior or posterior operation is chosen, the jejunum is so fixed that it can no longer exert traction on and so kink the duodeno-jejunal flexure. The so-called "no loop" operation affords the additional advantage of establishing an even greater strain on the beginning of the jejunum in a horizontal or upward direction. The absence or presence of an aperture of communication is, I believe, a matter of no moment unless at a later period the duodenal ulcer should cicatrize and so obstruct the normal outflow from the stomach.

However, in the consideration of the question of duodenal obstruction and ulceration, it must be clearly borne in mind that the obstruction at the end of the duodenum is itself secondary to obstruction at the end of the ileum. The obviation of the duodenal obstruction by the fixation of the jejunum, therefore, in no way affects the obstruction at the end of the ileum, and the infection of the dammed back contents of the small intestine continues as before the operation. At the same time the operation has reduced the tension in the duodenum, and if the inflammation of the mucous membrane resulting from this distention has ended in ulceration, the ulcer heals.

It is a striking fact in the examination of patients suffering from distention of the duodenum that tenderness over the duodenum is the only symptom observed by the patient, who is quite unconscious of the tenderness associated with the obstruction at the end of the ileum until his attention is drawn to it by the manipulations of the surgeon.

This duodenal tenderness is in my experience generally regarded by the surgeon as evidence of duodenal ulcer or distention of the gall-bladder; should he find on operation that neither condition exists, he removes the appendix, on the supposition, I presume, that even a normal appendix may produce this symptom. A fair proportion of patients on whom I have operated for chronic intestinal stasis have previously experienced this treatment, frequently at the hands of surgeons of great eminence. Such a mistake as this would seem to be unjustifiable with our present means of diagnosis. A surgeon has no right to operate until he has exhausted every possible means of diagnosis at his disposal. If expert X-ray evidence were obtained instead of relying alone on a digital

examination of the abdomen, a number of such mistakes could be avoided.

It appears to me that the point of greatest difficulty in the passage of material contents along the gastro-intestinal tract is through the last few inches of the ileum. This is particularly the case when the cæcum has been securely fixed by acquired adhesions in the iliac fossa. In such cases, the delay in the passage of material at the pelvic brim may be very great, and indeed in one of my cases, Dr. Jordan found on X-ray examination that the bismuth was delayed for 85 hours in the terminal coil of the ileum.

At the operation on this case there was no evidence of obstruction to the ileum in either of the more usual forms, namely by an acquired peritoneal band or by an appendix fixed in such a position behind the small bowel as to control the passage of its contents. Now this form of simple obstruction, which cannot be recognized at the time of the operation, and which can only be determined by bismuth and X-rays, I call the simple static variety, as opposed to the more obvious varieties which I have just mentioned. These latter are readily recognized when the abdomen is opened, though the effect on the passage of the intestinal contents can only be gauged by bismuth and X-rays. If with an uncontrolled ileal termination the delay may be very considerable, it will be obvious that a structure which by strain or pressure exerts apparently but a comparatively slight constricting influence on the lumen of the bowel may affect very materially the passage of material through it.

I will now pass on to a consideration of the sites of excessive absorption of toxins from the gastro-intestinal tract. Since the profession has begun to study the subject of autointoxication in chronic intestinal stasis, it has been inclined to assume that the large bowel is the sole source from which these toxins are derived, and it has got into the habit of looking on stasis as being purely colonic.

In consequence of this, operations have been conceived chiefly with the object of facilitating the passage of material through the colon, and in this manner the chief site of absorption has been overlooked and left untreated. This is largely due to Metchnikoff's views on the subject. He considers that if we had no large bowel we should live longer. This is perfectly true, as evidenced by the fact that the removal of the large bowel results in a marvelous improvement in the health and appearance of the individual and prolongs his life, but I would point out that this improvement does not prove that the colon is the chief site from which toxins are absorbed in excess. Indeed in a considerable proportion of cases, I believe the bulk of the absorption takes place from the small intestine.

Stasis in the small intestine, with the associated infection of its contents by organisms to which it is unaccustomed, is not primary, but is secondary to stasis in the colon. In other words, if it were not for the presence of the colon the conditions producing stasis in the small intestine would not arise. If the cæcum did not become overloaded as a part of a colonic stasis, obstruction at the end of the ileum would not develop. Consequently infection of the contents of the small intestine by extraneous organisms would not occur, the duodenum would not be blocked by the drag of the small intestine obstructed at the end of the ileum, the mucous membrane of the duodenum would not inflame and ulcerate, the biliary and pancreatic ducts would not be infected, and obstruction to the outflow from the stomach with all its sequelæ would not occur.

I hold that the extraordinary improvement that results from short-circuiting and from the disconnection or removal of the colon is due largely to the fact that the evacuation of the contents of the small intestine is facilitated by its introduction into the pelvic colon, and that the infection of its contents by organisms which grow in the material stagnating in the large intestine ceases abruptly. I do not wish to suggest that all absorption of toxins takes place from the stomach and small intestine, but I consider that the tract other than the colon plays an important, and, I believe, the more important, part in this process.

How are these cases treated? They are given germicidal drugs, which would appear to

me to act by diminishing the number and virulence of the offending intestinal organisms. I refer to such medicines as arsenic, iron, mercury, etc. Or they are supplied with organisms which are intended to antagonize the growth of deleterious organisms in the intestine, or vaccines of these organisms are injected into the circulation to effect the same purpose. Or they are given increasing amounts of irritating substances called purgatives, with the object of hastening the passage of the contents of the intestine, and so affording less time for infection of the contents by organisms and for the absorption of their products. Or they are cut off the use of such foods as decompose readily and produce poisonous material. Or they are given large quantities of water, to wash away as rapidly as possible the poisons that have been absorbed into the circulation and tissues. They are massaged and exercised, in order to stimulate the intestinal contents to move on. They have their stomachs washed out when material is dammed back and decomposes, and they have the large bowel flushed by abundant quantities of water, frequently containing antiseptic or irritating material. This represents the medical treatment and the essence of the so-called "cures" which frequently effect a temporary alleviation of symptoms. All these forms of treatment are tedious, dangerous and at the best only palliative. Much more benefit can be obtained by the use of pure liquid paraffin administered at regular intervals during the day. This substance has, as far as is known, no chemical action whatever; it cannot be absorbed in the human intestines, while it facilitates very materially the passage of the intestinal contents. The motions cease to be firm, and they are much less bulky than before, for the reason that the amount of organisms which forms a considerable proportion of normal fæces is greatly diminished. By the use of a spring support controlling the lower abdomen, any accumulation of fæcal matter in the ileum or in the cæcum, or in a prolapsed transverse colon, is obviated as far as possible, while the pressure on the veins of the splanchnic area keeps the brain better supplied with blood and more capable of carrying on its functions efficiently.

This treatment is adequate, providing the mechanical obstruction produced by one or more kinks is not too great.

If this be so, and if confirmation be obtained by X-rays and bismuth, some surgical means must be adopted to correct the faulty drainage and its results.

Let us now consider the treatment of chronic intestinal stasis in which there is an imperfect ileal effluent associated with recurrent obstruction of the duodenum, and possibly ulceration of its first portion. This condition can be treated by putting the patient in the supine posture for a time. In this posture the obstruction at the end of the ileum is no longer effective, and the kinking at the duodeno-jejunal junction no longer exists. The duodenal tension is relieved, and the ulcer, should it exist, heals. The patient feels very well for a time. On returning to the usual habits of life the obstructions recur and their consequences reappear. Or the patient may be operated on and a gastro-enterostomy performed. During the period the patient is in bed the ileal obstruction is in abeyance and the sufferer is no longer poisoned by absorption. The duodenum recovers itself and an ulcer, if present, heals. The patient resumes the ordinary habits of life, but has no recurrence of the duodenal pain and improves in health. But the symptoms of autointoxication still exist, and increase steadily as the termination of the ileum becomes more and more obstructed. It is quite possible at the time of the operation that the mechanical factor controlling the end of the ileum, whether appendix or acquired ligament, can be dealt with effectually and further operative treatment obviated. When the obstruction results solely from the mechanical control of the appendix, its removal frees the effluent of the ileum and the result is most satisfactory and lasting. If, however, an ileal kink has developed, consequent on the crystallization of lines of resistance in the mesentery, the treatment is not so simple.

When I first observed the kink as produced by the acquired ligament, I devised many

means for its division and for covering over the raw surface thus exposed, and I employed various methods of fixing the ileum in order to avoid recurrence of the kink. I soon, however, had several very unpleasant surprises in the more severe cases. I found that the freeing of the intestine occasionally resulted in an acute obstruction, the freed portion of ileum refusing to transmit its contents. I also found that even when the membrane had been divided and the patient had recovered from the operation, the toxic symptoms returned when active life was resumed. This, of course, did not occur in every case, but in the more advanced cases it did so much too often to be pleasant. Therefore, after a much extended experience and especially when bismuth and X-rays showed that there was associated with the ileal obstruction a marked degree of stasis in the large bowel, I have been in the habit of leaving the ileal kink alone and anastomosing the divided end of the ileum with the pelvic colon immediately below the last kink, and exaggerating the pelvic kink if I did not consider it sufficiently effective.

Again, when I find the large bowel very static, and especially if the abdomen is lax, I remove the colon without the slightest hesitation, since I feel that the risk of its removal in these circumstances is very small indeed, while the benefit the patient obtains from its removal is very great.

If I feel its removal entails any grave risk to the patient, I am satisfied to short-circuit and to postpone the removal of the colon until the patient, freed in great part from autointoxication, complains greatly of the flatulent distention of the large bowel.

It is of course obvious that the nature of the operative interference in any case must vary with the precise alteration in the mechanics of the drainage scheme and with the condition of the patient.

BIBLIOGRAPHY OF CHYLOUS CYSTS OF THE MESENTERY

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THE following are from notes made for a paper on chylous cysts presented to the American Gastro-Enterologic Association at its St. Louis meeting in June, 1910. This paper was prompted by a study of the medical and pathologic features of the case of Dr. C. E. Congdon and by a doubtful case seen with Dr. A. W. Hengerer, which did not come to section. In the July, 1912, issue of Surgery, Gynecology and Obstetrics, Dr. Emanuel Friend of Chicago reports an interesting case and tabulates 52 cases from the literature. To a large degree our series coincide; we employed the same method of tabulation, and to save space it is my intention simply to supplement Friend's list.

The following cases of Friend's list are not included in mine:

Case No. 22. Quinson.

Cases Nos. 29 and 30. Eve. These, from the notes I obtained, seemed to be not strictly chylous cysts.

Case No. 32. Benecke, unless this is one of my unidentified cases mentioned generally by L. Napoleon Boston in his article on chylous ascites in the *J. Am. M. Ass.*, 1905, but the two do not correspond in many details, notably recovery or death.

Case No. 36. Anifrejew.

Case No. 37. Ritter.

Case No. 38. Smoler.

Case No. 40. Panas.

Case No. 41. Peau, unless this refers to one of Pean's cases.

Case No. 42. St. Thomas Hospital Reports.

Case No. 45. Evans.

Cases Nos. 46 and 47. Brinsmade. These I excluded as probably mere degenerations of lymph glands.

Case No. 49. Beefraze.
Case No. 50. Burrows.
Case No. 51. Shattock.
Case No. 52. Key and Wilkinson.
Case No. 53. Friend's own case, the last five being published too late for my report.

The following discrepancies are worth noting. No. 12 of Friend's list, No. 33 of mine (my numbers not being in chronologic order) is attributed to Schlein by Friend, to Löhlein by me; the age is stated as 27 and 57 respectively; I have the size as that of a man's head and the operation as marsupialization. No. 19 of Friend's list, No. 38 of mine, is given by Friend as a multilocular cyst, all compartments containing chyle. According to my notes, there were three compartments, each of about a liter; one was serous, two were chylous. No. 22 of Friend's list, No. 40 of mine, is ascribed to Wenning. This is a misprint, the name being Weining. This was a unique case, evidently of acute nature, about fifty very thin walled cysts being found, of various sizes, from that of a fœtal head to an orange, rupturing on the merest touch. At necropsy, the thoracic duct could not be found. In No. 23 of Friend's list, No. 45 of mine, the name should be Hoover, not Hover. In No. 26 of Friend's list, No. 16 of mine, the name should be Syms, instead of Lynes. In No. 20 of Friend's list, No. 8 of mine, the name should be Enzmann, not Epymann. There are other minor discrepancies scarcely worth noting.

The following cases are reported in addition. The earlier ones are of especial interest, as they antedate the first formal description by Rokitansky in 1842, who is, as Dr. Friend states, usually regarded as the first to call attention to the condition. In justice to the early reporters it should be said that their descriptions clearly indicate that they understood the nature of their cases. Indeed, the literature of the 17th and 18th centuries is richer in allusions to lesions of the lymphatics than modern writings, and the profession generally seems to have had more erudition on the subject than we have, although they "knew some things that were not so."

It will be noted that my list of 79, and Friend's of 53, total 96 cases, though, as stated, the two cases each of Eve and Brinsmade, I had excluded as probably not genuine chylous cysts but rather local degenerative changes in lymph glands. However, it is quite likely that other cases, especially of small size, are of like nature. From various cumulative reports, and vague references to literature inaccessible to me, it appears that there are quite a number of other cases recorded. It is probable, also, that anyone who has gone into ancient medical literature more thoroughly than myself, will recognize several others. Lack of detail, in several instances, is due to my inability to consult the original references and it is possible, on this account, that certain cases may have been duplicated or assigned to secondary reporters. The identity of the mysterious W. (4th on my list, which follows Carsons' numbering for the twenty cases that he gathered, and 7th on Friend's list) ought to be known to the Germans.

With the exception of the early cases, preceding Rokitansky's, most of the reporters or their students are still living and, with this inevitably incomplete and inaccurate bibliography as a basis, it ought to be possible, by co-operation of national institutions of research, to secure a very full list of cases, with most of the important details. A bureau of record for rare cases certainly should be established, not merely for the sake of numeric completeness but because such a bureau could very early determine the proper form in which to list the salient features of any given condition under study. It is likely that about 200 cases could be accumulated in the world's literature.

It is not my present intention to discuss these cases in detail but I wish to emphasize the surprisingly favorable prognosis, especially when one considers that the recoveries have been the result of necessarily inexperienced workers, dealing with cases which had been properly diagnosed in only two or three instances. It is worth while also to correct a false impression. Senator has been repeatedly quoted as stating that true chylous effusions invariably contain sugar. What he really said was that, excluding diabetic cases, sugar was rather characteristic of true chylous

REPORTED CASES OF CHYLOUS CYSTS OF THE MESENTERY

Benelict's number.	Supplementary to Friend's No.	Reporter.	Where reported.	Sex and Age.	Operation.	Size.	Result.	Remarks.
9	54	Rokitansky	Lehrb. d. path. Anat.	M. 53	Necropsy		Death	
12	55	Eppinger	Prager Vrtljschr.[1]		Necropsy		Death	Reported as dermoid. Werth revised diagnosis.
21	56	Poncy, Jr., July 2, 1699	Busey	F. ? (young)	Necropsy [2]	Large	Death	Chylous ascites tapped several times. Bag of milky liquid at beginning of jejunum.
22	57	Le Mery, 1710	Southwall's Tr. Roy. Acad. Sci., Paris, 1754	F. 48	Necropsy	Very large	Death	Nun. Large, pendant umbilical hernia for years. Calcareous and soapy deposits besides chyle; 3 loculi.
23	58	Morand, 1729	Ibid.	M. ? (young ad.)	Necropsy	7½ lbs.	Death	
24	59	Truman Abell, 1825–33	Boston M. & S. J., 1833, vol. vii	F. 40	Drainage after spontaneous rupture	25 lbs.	Recovery	Also chylous ascites.
25	60	Hughes, 1841	Guy's Hosp. Rep., 1841, p. 297	M. 30	Necropsy		Death	Multiple cysts and chylous ascites.
26	61	Ducasset, 1846	Bull. d. l. Soc. Anat. d. Paris, 1848	Not Stated	Not stated		?	Multilocular, some containing yellow serous, others white milky fluid.
28	62	Millard and Tillaux	Bull. d. l'Acad. d. Méd., Aug. 17, 1880	M. 31	Resection	500 cc.	Recovery	
29	63	Pean	Cliniques Chir., 1881–83, v, 1328	F. 59	Resection after aspiration	12 liters	Recovery	Called cystosarcoma, and contents pus, but no sepsis; multiple.
30	64	Nickerson	Mass. M. Soc., 1884	M. 55	Tapping after rupture by hard work	2 qts.	Recovery	No urea; large amount of fat and albumin.
31	65	Hahn	Brit. M. J., June 18, 1887	F. 8	Resection	Hen's egg	Recovery	
32	66	Rubeska	Zentralbl.	F. 19	Enucleation	Fist	Recovery	
35	67	Rodriguez	Bull. d. l. Soc. Anat. d. Paris, 1891	Not stated	Not stated			
36	68	Frentzel	Bull. Med., 1892	Not stated	Marsupialization		Recovery	
39	69	S. Smith	Quoted by Weining	— 8	Excision		Recovery	Death later from disseminated tuberculosis, which caused blocking of lymph channels.
41	70	Frank	Wien. Klin.	F. 31	Extirpation [3]	Adult head	Recovery	Cholesterin, fat globules, and a few leucocytes.
42	71	Osler	Lect. on Diag. of Abd. Tumors, 1894, p. 123	M. 44	Necropsy (intestinal strangulation)	Man's head	Death	Observed 3 years. Tapped repeatedly; fluid 1 to 5½ gals. each time; at first dark and bloody, then creamy. Obvtously originally chylous ascites, but abdomen dry at necropsy.
44	72	Giordano	Clin. Chir., Milano, 1895	Not stated	No details			
46	73	Pagenstecher	Berl. klin. Wchnschr., 1895	M. 71	Marsupialization (opened after 6 days)		Recovery	Odor of fæces, but no communication with bowel.
48	74	Martin	Verhandl. d. Gesellsch. f. Geburtsh. u. Gynäk., 1896, xiv, 11	Not stated	No details			
49	75	Rosenheim	Verhandl. d. Ver. f. innere Med., Berlin, 1897	? (child)	Necropsy; volvulus	Each size of fist	Death	

[1] Winiwarter's and three other cases of cyst complicating chylous ascites are mentioned by L. N. Boston (loc. cit.). These three could not be identified, and Boston had not preserved his notes.

[2] Location: ileo-jejunal limit.

REPORTED CASES OF CHYLOUS CYSTS OF THE MESENTERY—*Continued*

Benedict's number.	Supplementary to Friend's No.	Reporter.	Where reported.	Sex and Age.	Operation.	Size.	Result.	Remarks.
54	76	Sarweg	Zentralbl. f. Gynäk., 1898, No. 16	F. 11	Resection; pedicle tied and cauterized	5 liters	Recovery	
55	77	Brun (Letulle)	Presse méd., July 26, 1899	F. 7	Excision	375 cc.	Not stated	
56	78	Castaing	Toulouse-méd., 1901, s. iii. 4447	Not stated	Extirpation		Recovery	
57	79	Treiberg	Laitop. Roussk. Clin., 1901	Not stated	No details			
59	80	Scharlemmer	Deutsche med. Wchnschr.; Am. M.. Dec. 18, 1902, p. 163	M. 53	No details	Child's head	Recovery	No connection with lymphatics, glands or pancreas could be determined at operation; retroperitoneal.
60	81	Schmidt	Mitth. d. Gesellsch. f. innere Med. u. Kindesheil., Vienna, 1904	Not stated	No details			
63	82	Demons	Quoted by Pfaff	Not stated	Marsupialization		Recovery	Two loculi; one contained blood, the other chyle.
64	83	Pfaff	Lancet-Clinic, June 24, 1905	F. 15	Enucleation	Orange	Recovery	Blood and urine negative.
66	84[1]			M. (child)	Cœliotomy		Recovery	
67	85[1]			F. 5 mos.	Tapping		Recovery	Several cysts.
68	86[1]			M. 5 wks.	Aspiration		Recovery	
69	87	Stark	Lancet-Clinic, 1907	F. 56	Not stated		Recovery	Three loculi, 2 bloody, all oily, crowding intestines into supra-umbilical hernia; 2. calcium carbonate calculi in cyst.
71	88	R. Hintz	Arch. f. klin. Chir., 1910, xci, No. 3	F. 22	Enculeation	Fist; 300 cc.	Death	No apparent cause for death, unless morphin-scopolamin-chloroform. Origin, ileo-jejunal junction.
78	89	R. Hintz	Ibid.	M. 36	Resection after tapping	600 cc.	Recovery	
72	90	C. F. P. Horsell	Verbal report, June, 1910	F. 66	Evacuation (cysts ignored)[3]	Rice, pea, hazelnut, double fist	Recovery	Two or three hundred cysts, with 3½ gals. chylous ascites.
73	91	von Bergmann	Langenbeck's Arch., 1887, p. 201	Not stated	No details			
74	92	Reichel	München. med. Wchnschr., 1907, p. 808	M. 6	Resection of large cyst	Pea, walnut. man's head	Recovery	Very many cysts.
75	93	E. C. Stabb	Quoted by Eve, Med.-Chir. Trans., 1898, lxxxi	M. 6	Resection	2 in. in diam.	Recovery	Unique location, on outer surface of small intestine, opposite mesenteric attachment.
76	94	Zdarek	Zeitschr. f. Heilk., 1906	Not stated	No details			
77	95	Winter and Elter	Brun's Beitr. z. klin. Chir.	M. 13	Marsupialization	800 cc.	Recovery	Retroperitoneal.
79	96	Paul Klemm	Arch. f. path. Anat. u. Physiol.	M. 2½	Resection of cyst and compressed ileum after tapping	Child's head	Recovery	Multilocular.

[1] First 20 of Benedict's series taken from Carsons, whose case is No. 15 of Friend's list.
[2] For occlusion and dilatation of lymph channels.
[3] Operation one foot above ileo-cæcal valve.

effusions. It is obvious that sugar need not necessarily be present.

The following statistics of the whole series of 96 cases may be of interest.

Sex incidence: Males, 39, females 37, not stated 20, hence no sex predilection.

Age incidence at necropsy or operation: Under 1 year, 5; 1 to 5 years, 6; 6 to 10 years, 9; 11 to 15 years, 4; 15 to 20 years, 7; 21 to 30 years, 15; 31 to 40 years, 12; 41 to 50 years, 6; 51 to 60 years, 8; 61 to 70 years, 3; 71 to 80 years, 3; not stated, 18, but, of these last, 2 were children, one a young adult and one was "young." With due allowance for accidental variations among rare cases, long duration of many cases and distribution of population as to age, it can not be stated that any age is especially predisposed.

Prognosis. Sixty cases recovered, 14 died after operation, 12 were diagnosed at necropsy, sometimes after many years duration, sometimes after death due to other cause; in 10 cases the result was not stated. Hence the prognosis is surprisingly good.

Nature of operation. Aspiration, mainly in early cases, 5; drainage, mainly after preliminary incision, occasionally after spontaneous rupture, 24; some form of enucleation or resection, 31; marsupialization, 4. In a few cases the cyst seems to have been ignored and, in cases of multiple cysts, the small ones were merely ruptured or ignored. In several cases, the nature of the operation is vaguely stated. It does not appear that the result depended upon the choice of operation but upon essential features of the case or the superior advantages of modern surgery, especially with regard to asepsis, although some of the early cases recovered in spite of the absence of such precautions. While all the marsupialized cases recovered, the deaths after extirpation or enucleation seem to have been due to primitive methods, intestinal occlusion, peritonitis, et cetera, and not to choice of method, and, indeed, some of those not stated to have been marsupialized may have been two-step operations.

THE VALUE OF COMPLETE PHYSIOLOGICAL REST OF THE LARGE BOWEL IN THE TREATMENT OF CERTAIN ULCERATIVE AND OBSTRUCTIVE LESIONS OF THIS ORGAN[1]

With Description of Operative Technique and Report of Cases

By JOHN YOUNG BROWN, M. D., St. Louis

THE value of rest in the treatment of inflamed and infected abdominal viscera has long been recognized. The opium treatment of peritonitis as advocated by Alonzo Clark, which has long since been abandoned, and the more recent so-called starvation treatment of Ochsner, have for their purpose the arrest of intestinal peristalsis, thereby bringing about bowel tranquilization. Complete physiological rest of certain portions of the large bowel, usually the rectum and lower sigmoid, as accomplished by means of left-side colostomy, is of well-known worth, both as a life-saving procedure in acute and late obstructions and as a protective measure in cases where subsequent radical work is contemplated.

The various short-circuiting and exclusion operations upon the gastro-intestinal tract are of undoubted value in selected cases. It is my purpose to point out in this paper the advantages of complete physiological rest of the entire large bowel in the treatment of certain diseases of this organ, which have heretofore been treated by some of the surgical methods above mentioned, and to describe a technique by which this rest can be accomplished, and when its purpose has been ful-

[1] Read before the Southern Surgical and Gynecological Association, December 17, 1912.

filled, the bowel can be put back into commission in a manner both safe and satisfactory.

One of the principles on which modern intestinal surgery is based, and which has been responsible for its wonderful progress and marvelous accomplishments, is the principle of rest. Take, for instance, some cases of stricture of the œsophagus. Who has not seen some of these relax following the rest afforded by a gastrostomy? In gastric and duodenal ulcer an abundant clinical evidence has demonstrated the value of the partial rest given to the pylorus and duodenum by gastroenterostomy. The type of cases in which we have found this surgical rest treatment of value may be enumerated as follows:

1. Mucous colitis associated with obstructive lesions.
2. Ulcerative colitis (amœbic, bacillary, tuberculous, etc.).
3. Obstructions to the colon, both acute and chronic, due to neoplasms.

MUCOUS COLITIS

It has been our experience that in the majority of the cases of mucous colitis both the symptoms and X-ray findings show marked evidence of interference with the normal fæcal flow, with the accompanying toxæmia invariably associated with chronic intestinal stasis. At operation the cæcum is generally found in the pelvis, dilated and surrounded by well-defined membrane. Angulations are found at the hepatic and splenic flexures, with the transverse colon sagging almost to the pelvic brim, even with the patient in the Trendelenburg posture. Many of these cases receive marked temporary benefit from the Weir Mitchell and other medical treatment, associated with posture and properly adjusted orthopedic appliances. It is in this type of case that Lane has adovcated the removal of the entire large bowel down to the sigmoid. Finding this operation too radical, he later has practiced the short-circuiting exclusion operation.

Coffey, a fellow of this association, has recently published an able and beautifully illustrated paper in which he describes an elaborate fixation and hammock-swinging procedure for the correction of the deformities of these unfortunates. While I have obtained some brilliant results from the operation of Lane, I have had, however, a number of cases in which most distressing post-operative symptoms have developed, for the relief of which secondary operations became necessary. I have never undertaken the suspension operation of Coffey, as my experience with similar fixation operations in the past has been far from satisfactory.

The technique which I will shortly describe seems, from my comparatively limited experience, to meet indications better in the cases under discussion than either of the methods above mentioned. By it all pericolic bands and adhesions can be severed, the cæcum elevated from the pelvis, and the intestinal stasis immediately relieved. The entire colon can be put at rest, and during this process of complete physiological rest the patient can be given the benefits which follow dietetic, hygienic, and orthopedic treatment, thus giving the bowel a chance to regain its normal tone.

ULCERATIVE COLITIS (AMŒBIC, BACILLARY, TUBERCULOUS, ETC.)

While many of the ulcerative types of colitis respond to medical treatment and colonic lavage, the severer types are now recognized as surgical. In the operative treatment of such cases, three procedures have been resorted to: First, appendicostomy; second, cæcostomy; third, ileosigmoidostomy. All of these operations are objectionable. The first two simply permit of colonic irrigation and medication. As fast as the colon is flushed with solutions it refills with the fæcal contents from the small bowel; thus the area under treatment is constantly contaminated. A very serious objection to the short-circuiting operation is that the lower pelvic colon is almost invariably involved in the colitis, and it is impossible in the majority of cases to bring a loop of ileum to a part of the sigmoid distal to the disease; hence, when this is done, some degree of the symptoms, namely, that due to the sigmoid below anastomosis, will persist.

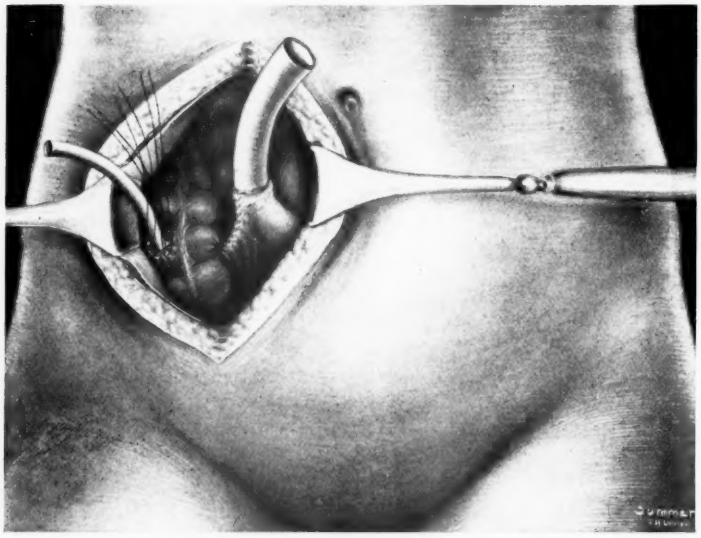


Fig. 1. Showing tube and purse-string in proximal portion of ileum. Stump where appendix was removed and stump of inverted distal ileum. Also catheter and purse-string in sigmoid, showing fixation sutures.

OBSTRUCTIONS TO THE COLON (BOTH ACUTE AND CHRONIC) DUE TO NEOPLASMS

The advantage of the operation suggested by the writer will readily be seen when it is applied to the treatment of acute and chronic obstructions of the sigmoid and rectum. It possesses all the advantages of the left side procedure, with none of the disadvantages. It permits a drainage of the distended small intestine, as well as rest and irrigation of the large intestine. In those cases of low bowel obstruction in which the diagnosis is in doubt, it should be the operation of choice. A left-side artificial anus is easily made, but we all appreciate the difficulty of closing it. If the obstruction is due to an inoperable malignancy, the left-side anus possesses no advantages over the right-side method. If the diagnosis is wrong and the growth is a benign one, it will readily be seen that the left-side operation should not be undertaken, for the reason that its closure is both difficult and dangerous and will greatly interfere with the subsequent surgical treatment, namely, the closure of the artificial anus. Another advantage of the right-side anus is the relief afforded the patient when constantly inhaling the horrible stench that is the invariable accompaniment of the left-side operation. The contents of the small bowel possess only a slight odor and, contrary to former teachings, there is no irritation of the skin. On the contrary, when the operation is done on the left side, the stagnating and filthy fæcal flow from the colon brings about a condition almost unbearable.

OPERATIVE TECHNIQUE

Through a right rectus incision sufficiently long for general exploratory purposes the abdomen is opened. The cæcum is at once sought and the large bowel is carefully examined from cæcum to sigmoid. All pericolic adhesions are then severed, the appendix removed, and the stump buried. The ileum is next severed between two clamps, close to the ileo-cæcal valve. The distal ileum is tied off and buried as was the appendix. At a suitable part of the cæcum a purse-string, suture of linen is placed, and the cæcum is next incised. Through this incision a large rubber catheter is inserted, after which the purse-string is tightly tied. A second purse-string of No. 1 chromic catgut is next placed. Under the loops of this purse-string, three long catgut fixation sutures are placed (Fig. 1). A stab-wound is next made at McBurney's point, through which a forceps is inserted. The catheter and fixation sutures are grasped in the bite of this forceps and pulled through the stab-wound. The peritoneal

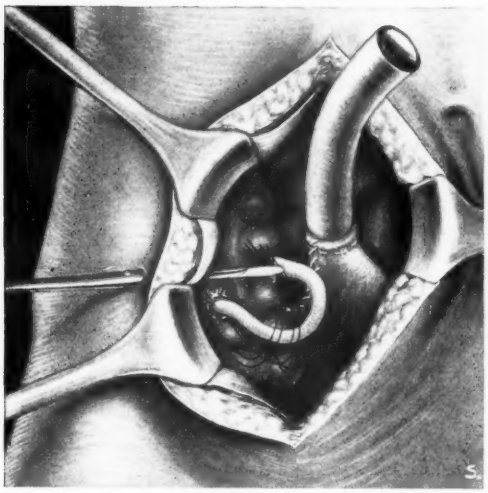


Fig. 2. Method of making stab wound. The forceps shown grasping the catheter and fixation sutures.

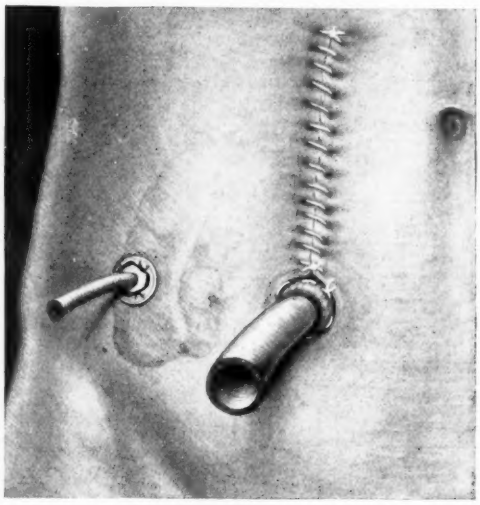


Fig. 3. Showing catheter and button in place with fixation sutures tied. Artificial anus with tube in proximal portion of ileum. Wound closed.

surfaces surrounding the catheter are next scarified, and the catheter is pulled through the stab-wound, carrying with it the three fixation sutures. The catheter is now slipped through the button, and the fixation sutures are threaded through the eyes in the button and tightly tied, thus closely approximating the serous surfaces of the cæcum to the parietal peritoneum (Fig. 2). A stiff rubber drainage tube is next inserted into the proximal ileum and fixed with a double purse-string suture. The ileum is now brought out of the lower angle of the rectus incision. The parietal peritoneum is made to hug it snugly by a few catgut sutures, and the abdominal wound is closed in the usual way (Fig. 3). Indications for restoring the continuity of the large bowel are improvement of the general condition and the return to normal of the discharge from the excluded large bowel as shown after repeated chemical, microscopical, or culture-growth examination of irrigation fluids passed through it, depending upon the lesion present. This restoration should not be made too early, particularly in the ulcerative lesions of the colon. When the surgeon deems that the large bowel has sufficiently healed and desires to put this organ back into commission, this restoration is readily done by simply cutting out the anus at the lower angle of the rectus incision, closing its end with a purse-string suture, and making a lateral anastomosis of ileum to ascending colon, or switching the ileum into the sigmoid. We have never found any difficulty in restoring intestinal continuity; on the contrary the operation is simple and easy.

REPORT OF CASES

This report is based upon the experience we have gained from ten cases so operated. Two were cases of chronic intestinal stasis, with obstructions due to pericolic bands and flexures. Both have greatly improved and are now comparatively well. Three operations were done for the relief of amœbic dysentery. All were cured. One for ulcerative colitis with extensive involvement of sigmoid and rectum. This patient is now in good health. One case for extensive obstructive tubercular colitis. This patient received great relief from the operation and lived in comfort for two months. Three were for late and inoperable malignancies of the rectum. One lived six months, one five months, and the third case, still living, nine months after operation, is comfortable, and is in reasonably good health; so it will be seen that there was no mortality in the series.

THE FIRST SUCCESSFUL CASE OF RESECTION OF THE THORACIC PORTION OF THE ŒSOPHAGUS FOR CARCINOMA[1]

By FRANZ TOREK, A. M., M. D., New York City
Surgeon to the German Hospital and the New York Skin and Cancer Hospital; Adjunct Professor of Surgery in the New York Post-Graduate Medical School

THE resection of the thoracic portion of the œsophagus for carcinoma has been one of the greatest problems of modern surgery. It is not the object of this paper to give the history of œsophageal surgery; much less could I mention the notable achievements of any one surgeon without injustice to others not named. But I must call attention to the view expressed by one of the most competent representatives of this branch of surgery, not only because it exerted a far-reaching influence on the efforts of others, but especially because my case does not substantiate this view. I refer to the standpoint of Sauerbruch that operations for carcinoma of the œsophagus should be undertaken only if the new growth is either high up near the neck or low down, where an anastomosis with the stomach could be made, but that the growths in the middle portion of the œsophagus are not removable. The reasons for excluding these cases from the realm of operative interference were, first, the inaccessibility of that portion of the œsophagus which passes behind the arch of the aorta, and secondly the danger arising from injury to the pneumogastric nerves, which in that location branch in front of the œsophagus like a plexus. Division of both vagi at a place before they reach the heart causes instant death, and at operations in that region it has been repeatedly observed that tugging at a vagus, or pinching it, was promptly followed by collapse of the heart, as manifested by the pulse, which persisted for a longer or shorter time, until death set in. Finally, the uncertainty of the closure of the upper stump of the œsophagus, and consequent infection of the pleural cavity, has been a source of great danger after resection in any part of the œsophagus where an anastomosis could not be made. The leakage from that stump was doubtless due to the tension in the œsophagus from swallowed saliva. Every contraction of the constrictors of the pharynx would temporarily increase the tension in this blind pouch, until the suture finally was unable to withstand the pressure from within. The patients who had escaped death either from injury to the vagus or from shock, pneumothorax, or pneumonia, all died from the giving way of the œsophageal closure, no matter how skillful the operating surgeon had been.

Statistics show that carcinoma of the œsophagus is most frequently found in the middle third, the location in the lower third coming next, while those in the upper third are comparatively rare. On the other hand, metastases are found most frequently with those situated in the lower third, near the cardia. Since, therefore, the carcinomata at the cardia are not only numerically less frequent than those in the middle third, but are also more frequently associated with metastases that render the cases incurable, the most important rôle in the problem of cancer of the œsophagus seems to belong to the carcinomata in the middle portion, the very ones that Sauerbruch and others advised leaving untouched.

In a case operated at the German Hospital on March 14, 1913, I succeeded in demonstrating the feasibility of resection of the middle portion of the œsophagus for carcinoma. The patient, a woman 67 years old, had a carcinoma of the œsophagus beginning just below the lower border of the transverse portion of the arch of the aorta and extending from there downward for about 1¾ inches. A pair of very beautiful stereoscopic X-ray pictures taken by Dr. William H. Stewart demonstrated the condition before the operation. A reproduction of one of these is seen in Fig. 1. I had performed a gastrostomy upon her some time previous to the resection of the œsophagus. Knowing the difficulties of the case, the problem was to plan the ways

[1] Read before the New York County Medical Society, March 24, 1913; the Harlem Medical Association, April 2, 1913; the Surgical Section of the New York Academy of Medicine, April 4, 1913; and the German Medical Society of New York, April 7, 1913.

Fig. 1. The bismuth shadow shows where the constriction of the œsophagus begins.

Fig. 2. Photograph taken 12 days after the operation. The black line accompanying the incision is a nitrate of silver marking made the day before the operation. The upper end of the incision is almost at the level of the shoulder. The anterior end of the incision is seen in Fig. 3.

and means of overcoming them. It was necessary, first, to afford better access; secondly, to perform more careful dissection of the vagi, avoiding rough handling of them; and thirdly, to do away with the danger of leakage from the proximal stump after resection.

The method of access to the field of operation was as follows: Instead of going through two different intercostal spaces and dissecting off the scapula, or of resecting several adjacent ribs, as recommended by others, the incision was carried through the whole length of the seventh intercostal space, from the posterior end of which it was extended upward by cutting through the seventh, sixth, fifth, and fourth ribs near their tubercles, which gave a much better exposure and is far simpler. The photograph (Fig. 2) shows the scar from the incision, the upper end of which is almost at the level of the shoulder; the front end of the incision is seen in Fig. 3. The black line accompanying it is a marking with nitrate of silver made on the day before the operation.

Extensive adhesions between the lung and the parietal pleura were present, the greater part of the lower lobe being attached both to the costal and the diaphragmatic pleura. The firmest adhesions were at the apex. All these were separated. The tumor was found to be fairly fixed in the position above described, viz.: just below the lower border of the transverse portion of the arch of the aorta, allowing only very slight mobility. The portion of the œsophagus below the tumor, between it and the diaphragm, was exposed in the usual manner by incising the pleura, drawing the vagi aside, and lifting the œsophagus out of its bed. At the site of the tumor the dissection of the vagi was more difficult, and some of the branches crossing over in front of it had to be cut in order to permit liberating the tumor without undue roughness in handling the vagi. To my great satisfaction the pulse never wavered during this procedure, remaining between 93 and 96. The dreaded vagus collapse had, therefore, been safely avoided.

The dissection of that part of the œsophagus which passes behind the arch of the aorta offered great difficulties, which were finally overcome by dislodging the aorta at that site and lifting it forward, after having ligated and divided a number of its thoracic branches. Getting the aorta out of the way, where it crosses the œsophagus, is of considerable help in liberating the latter; in simple cases, however, I feel certain that the dissection could be

Fig. 3. Photograph taken 12 days after operation. The incision at the anterior border of the left sterno-cleidomastoid muscle, through which the œsophagus was taken out is scarcely recognizable. The œsophagus has been placed under the skin of the chest and its end sutured to an incision in the skin. The gastrostomy tube is introduced into the œsophagus whenever the patient desires to swallow.

done without ligating the thoracic branches of the aorta. The tumor was attached to the left bronchus, which sustained a longitudinal cut during the progress of the separation of the tumor from it. The cut in the bronchus was afterward sutured with silk.

The œsophagus had now been detached from its bed, beginning at a point about an inch above the diaphragm, up to about an inch above the arch of the aorta. The resection of the carcinoma *in situ* could therefore have been easily performed. But my plan was different. I had come to the conclusion that the rational way to deal with the danger of leakage from the upper stump of the œsophagus was to eliminate that organ from the pleural cavity altogether. I therefore dissected the œsophagus loose from its attachments all the way up to the neck, divided it with a cautery at a safe distance below the carcinoma, after double ligation, and brought the œsophagus with the tumor out through an incision in the neck at the anterior border of the left sterno-cleido-mastoid muscle. Thus the pleural cavity could not possibly become infected from that source. The ligation of the lower stump had been made after first crushing the œsophagus at that site. This stump was invaginated like an appendix stump, only with the difference that two successive purse-string sutures of silk were used instead of only one, as in the case of the appendix.

The thorax was now closed, silk threads being used to hold the seventh and eighth ribs together, chromicized catgut for the muscles, and silkworm gut for the skin. No drainage was employed. Now the œsophagus which was hanging out from the wound in the neck was placed under the skin of the chest. For this purpose a transverse incision was made in the skin at a place corresponding to what was going to be the free end of the œsophagus after the carcinoma was cut off, for at the time this was still attached. The site of that incision in this case corresponds to the second intercostal space. The skin between the incision in the neck and the new incision was tunneled, the œsophagus drawn through, the carcinoma cut off, and the fresh rim of the œsophagus sutured to the skin. The neck wound was closed.

As regards other details of the operation, I may say that the incision through the skin and muscles was made under local anæsthesia, one half per cent novocain with suprarenin being used. The general anæsthesia was given by tracheal insufflation according to Meltzer-Auer, the apparatus constructed by Dr. Hermann Fischer being used. It worked very satisfactorily. The employment of a differential pressure chamber, either positive or negative, could not be considered, as the rubber cuff around the patient's neck used in such an apparatus to separate the air about the head from the air about the body would have interfered with the operation at the neck.

From the notes taken by Dr. Carl Eggers, who administered the anæsthetic, I extract the following: For the induction of anæsthesia, 15 cc. of

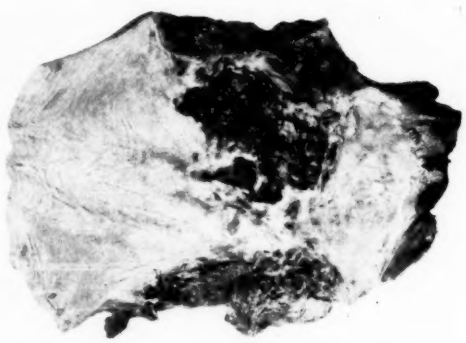


Fig. 4. On the left side a portion of the specimen has been removed for pathological examination.

anæsthol was used. Then intubation was performed, a woven silk catheter, No. 18 French, being introduced with the aid of the finger. The catheter was fastened to the upper lip by a suture, as the patient had no teeth to which to tie it. Ether was used now for anæsthesia, 100 cc. sufficing for the entire operation. The pulse was regular and of good quality throughout the operation except when the aorta was strongly pulled over for the purpose of suturing the cut bronchus. At that time it became weak and rose to 102. Strychnin, caffein, and camphor were used for stimulation. A hot coffee enema with whisky and strychnin was also given at the end of the operation. The intrathoracic portion of the operation, from the incision of the pleura to the closure of the thoracic cavity, took 1 hour and 45 minutes; the whole operation, from the first incision to complete closure, 2 hours and 43 minutes; the general anæsthesia, 2 hours and 27 minutes.

The microscopic examination of the specimen made by Dr. Frederick B. Humphreys proved the new growth to be a squamous celled epithelioma. From his description I quote the following: In the center of the speciman (Fig. 4) there is a ragged indurated ulcer, roughly circular in form, measuring 4.6 cm. across and 4.3 cm. from above down. The ulcer extends over the entire circumference of the mucosa, excepting a small strip about 0.8 cm. in width. The floor of this ulcer is ragged, reddened, and firm, the edges raised and nodular and fairly well circumscribed. The adjacent portions of the œsophageal mucosa show a few small, non-ulcerated, raised nodules, but at the lines of section the mucosa appears entirely free from invasion. The outer surface is rough. The external coat is slightly lacerated, but nowhere has the tumor macroscopically grown through, excepting in one region where there is a nodule about 1 cm. in diameter. Immediately over this nodule is a soft anthracotic lymph node attached to the muscle.

My assistants at the operation were Drs. Frederick H. Dieterich, Martin Bry, and Albert Barge, members of the house staff of the German Hospital. The patient made a good recovery. The stitches were removed, some on the fourth day and the remaining ones on the seventh day, when the wound proved to be completely closed. The pulse, respiration, and temperature had become normal by the fifth day. The highest point that the temperature had reached was 102° F., on the third day after the operation.

Up to the eighth day after the operation the patient was nourished in the same manner as before the operation, through the gastrostomy tube with a funnel attached. After that time the free end of a gastrostomy tube was introduced into the cut end of the œsophagus for the purpose of feeding the patient (Fig. 3). The rubber tube being of somewhat smaller caliber than the œsophagus, the patient has to make slight pressure upon the skin to one side of the tube to prevent leakage. This is accomplished by the patient without the slightest trouble, and she now swallows all varieties of food that can be chewed into an almost fluid state, such as bread, cereals, potatoes, eggs, spinach, etc. As she had not been able to take any bread for about nine months before her operation, she feels very happy with her rubber œsophagus.

A number of methods of œsophagoplasty have been devised, the most promising of which at the present time seems to be that of Jianu, utilizing the greater curvature of the stomach to form an œsophagus. This is placed under the skin of the thorax and in favorable cases may reach up to the end of the divided œsophagus so as to render a union of the two ends possible.

Now that the way for a successful performance of this operation has been shown, it is our evident duty to advise operation as soon as the presence of a carcinoma of the œsophagus is recognized, remembering that success depends to a great degree upon early diagnosis and early operation, and that it is not wise to wait until the difficulty in swallowing becomes marked before our suspicion of the presence of cancer is aroused.

PROSTATECTOMY; WITH SPECIAL REFERENCE TO THE SEQUELS[1]

By JAMES E. MOORE, M. D., Minneapolis, Minnesota

WHEN we first began to perform prostatectomies we usually did the suprapubic operation, and only removed the projecting portion of the prostate. The operation was blind, bloody, and unsatisfactory, and the mortality rate was high. The immediate results were sometimes satisfactory, but a return of the obstruction was not uncommon. Under these conditions the operation was not a popular one. The present popularity of prostatectomy began with the development of the perineal operation, which was a complete operation, was followed by better and permanent results, and was accompanied by a lower mortality rate. For a time this operation was very popular, and the journals were filled with reports of successful results. Had the unsuccessful results been as faithfully reported, the operation never would have become so popular. At the present time perineal prostatectomy, in capable hands and in properly selected cases, is a life-saving and conservative operation, and is the first choice of many of our best surgeons.

After the advantages of a complete enucleation of the gland had been demonstrated by the perineal operation, it was found that the gland could be readily enucleated through the suprapubic opening, and it is now the most popular operation. Even after the upper operation had become quite popular its mortality rate was considerably higher than that of the lower operation. At the present time the mortality rate of the two operations is practically the same, and is naturally lower than it was during the period of development. I was an early and enthusiastic advocate of the lower operation, but as time has gone by and as the technique of the upper operation has become developed I have found myself resorting more and more frequently to the latter operation, and this has been the general trend of surgeons. No surgeon should be wedded to one operation, but should be proficient in both, so that he can fit the operation to the patient and not the patient to the operation. The popularity of the upper operation is largely due to the fact that it is the easier operation to perform. Its enthusiastic advocates claim that there are fewer complications and sequels, and that convalescence is shorter and more satisfactory, but these are still moot points.

Fig. 1.

When the possibilities of complete prostatectomy were realized the operation was soon being overdone by many surgeons — and was undertaken by many would-be surgeons. The reaction was natural and wholesome, so that now expert operators are more conservative and novices have learned that it is not a good operation to experiment with. A few years ago one enthusiast said that the operation was so simple and easy that it should be relegated to minor surgery; but I am sure that all my hearers will agree with me that it is a serious major operation, and that it should not be undertaken lightly by the experienced surgeon, and should never be undertaken by the occasional operator.

It would be a waste of your valuable time to describe the technique of these operations, because it has been so often and so well written; but there is one practical point in the

[1] Read before the Southern Surgical and Gynecological Society, December 19, 1912.

technique of the upper operation which I have practiced and taught to my students for a number of years, and to which I wish to call your attention. Most writers recommend that after the suprapubic opening is completed and the operator is ready to attack the gland, he begin by cutting or tearing through the mucous membrane of the base of the bladder over the most prominent part of the enlargement. I have found it much easier and quicker to force the point of the index finger into the internal meatus until the mucous lining breaks, when the finger can be readily passed through this break and the gland enucleated. In this way the gland can be enucleated nearly as quickly as the cut could be located and made in the mucous membrane, and with much less hæmorrhage. I can heartily recommend this little maneuver. It was original with me, but others have also discovered it. Dr. L. L. McArthur, of Chicago, published the first description of it.

The general practitioner should be interested in prostatectomy, and should be familiar with its possibilities and its indications and contraindications, for it is usually to him that the patient first goes for relief. Conservatism should be the watchword in these cases, but it is not conservatism to postpone operation until organic changes have taken place in the bladder and kidneys. Every general practitioner should fully realize that when he is called to relieve a patient from retention of urine due to an enlarged prostate he is facing a grave responsibility. Up to this time the patient may have had little or no suffering, but will only have been inconvenienced by being obliged to get up at night to urinate. If the bladder is emptied aseptically at this time, the patient may go on indefinitely without serious trouble; but should the doctor, through carelessness or by use of a dirty catheter, infect this bladder, the patient is immediately in a serious condition, which may end in death in spite of all human agencies.

Prostatectomy is too grave an operation to recommend simply because the patient has an enlarged prostate which is causing him some trouble. An enlarged prostate is very easy to diagnosticate, and should not be overlooked by anyone. The general practitioner, when clean and careful, can with propriety resort to an occasional catheterization, but when its repeated use is called for he should take this as a positive indication for prostatectomy. At the present day a patient should never be introduced into catheter life without first having had the advantages of prostatectomy urged upon him; for the average length of catheter life is not over four years, and if every patient were to have a prostatectomy performed when he begins to have serious trouble, the average length of life would be very much longer than this.

Old age is not of itself a contraindication for the operation, because many successful operations have been performed upon patients well up in the eighties. When a patient has not been properly advised, or has refused to accept good advice and has drifted along until there is extensive infection of his bladder, with possibly infected kidneys, he is not a choice subject for prostatectomy; but without operation he will surely be a great sufferer and will live but a short time, so it would be wrong to deny him the benefits of surgery. In such cases suprapubic drainage can be safely established under local anæsthesia, which will afford wonderful relief, and quite frequently the patient will improve so much after this that a prostatectomy may become advisable.

Prostatectomy even in suitable cases is not always satisfactory, because of sequels which make the patient feel that he is little better off than before the operation; and occasionally he is worse after the operation than he was before. Not infrequently a patient who has been operated upon and discharged by the surgeon in a seemingly satisfactory condition comes back to the family doctor suffering from some sequel that makes his life miserable.

When a comparatively young man has trouble enough with his prostate to induce him to consider prostatectomy, the effect it will have upon his sexual powers is a very important question. It is quite customary in reporting results from prostatectomy to state that the sexual function is unimpaired. We know that this is a truthful statement in many

cases, but every observing surgeon knows that there are many cases where this function is either greatly impaired or totally destroyed by the operation. When the ejaculatory ducts are destroyed, as they usually are, the patient is necessarily sterile, which is a matter of comparatively little importance, for most of these patients are sterile before operation, but unfortunately many of them are impotent after prostatectomy. It is difficult to get at the truth in this matter, for the patient considers his condition a disgrace rather than a misfortune, and is not disposed to talk about it. Very naturally, however, he will not recommend the operation to his friends.

The fact that prostatectomy does not always cause impotence proves that the loss of the gland is not the cause of this unfortunate sequel. The destruction of the ejaculatory ducts cannot be the cause, else impotence would be the rule instead of the exception. Until we have learned just what it is that causes impotence after this operation it is impossible to prevent it. It is rational, however, to conclude that, inasmuch as erection is due to a reflex stimulus, the damage must be due to an injury to the nerve supply. When we take into consideration the fact that at best prostatectomy is a rough and rather unsurgical operation, performed upon parts highly organized and with a most delicate and sensitive nerve supply, the marvel is that impotence does not always follow.

Gangrene of the bladder is an occasional sequel. I have had one case of this kind within a year. A suprapubic operation was easily and quickly performed and the patient did very well for four days, when his pulse began to go up, and he soon died. The bowel was not injured, but the whole base of his bladder was gangrenous. The possibility of this sequel should be remembered, and unnecessary bruising and tearing should be avoided. In this way the danger of gangrene will be reduced to the minimum, but the probability is that it will occur occasionally in spite of every precaution.

Every surgeon learns to search the bladder carefully for stone at the time of the operation, because many cases are on record where stones were left which necessitated a second operation for their removal. There is no doubt but that stones do sometimes form in the bladder after the operation, for which the operator should not be held responsible. Doubtless, fragments of the prostate or clots of blood act as a nucleus around which a stone may form. That they may form quickly I am convinced from the following experience. I performed a suprapubic prostatectomy, removing a very large prostate through a badly infected bladder. Owing to the condition, I thought of the possibility of stone, and explored the bladder most carefully, both with fingers and instruments, and found no stones. The patient had been bedfast for some time before the operation, but made a very rapid convalescence and soon resumed his business, being, as he stated, in perfect health. In much less than a year, but just how many months after the operation I do not know, he came to my office stating that he was having pain and frequent urination. I suspected stone, and advised him to go to the hospital for examination. This suggestion did not seem to meet with his approval, for I did not see him again. Some time afterward I learned that he came under the care of another surgeon, who removed a large stone from his bladder. This surgeon informs me that the patient came to him suffering from an abscess in the abdominal wall at the seat of the scar, and that the presence of the stone was not known until found when the abscess was opened. The stone was a large one, but I am confident that it must have formed after the operation, because I searched so carefully for it at the time of my operation, and because the patient was so thoroughly relieved by the operation.

This skiagraph (Fig. 1) illustrates how stones may be in a pocket so that they escape detection. This patient was operated upon at the University Hospital by one of the staff. The perineal operation was performed and a very large prostate removed. The opening required was so large that it caused the operator some uneasiness, but it afforded ample opportunity to examine the bladder, which was carefully done. The patient, although old and quite feeble, made a prompt

recovery and soon began to void urine naturally. When he was about ready to go home he reported that he had passed two stones through the urethra. The stones resembled medium size gallstones, and were faceted. Before passing the stones he had been perfectly comfortable, but this can be accounted for from the fact that they were closely packed in a pocket. In the original plate this mass is distinctly shown to consist of many stones closely packed together, but this print does not bring this out clearly.

Careful search for stone should be made after every prostatectomy, for they are so often present and they should not be overlooked. A skiagraph should be taken before every operation, which will demonstrate the presence of all stones, whether pocketed or not. Before closing the wound the bladder should be thoroughly emptied of all detritus, and later all blood clots should be removed.

In early cases of prostatism, where the obstruction is not too great and the cystitis not too severe, the cystoscope is very helpful. Stones can be detected, the condition of the mucous membrane ascertained, and the ureters catheterized. In older cases, however, the cystoscope is liable to do more harm than good. The greater enlargement makes the introduction more difficult and painful and elevates the beak of the instrument so that the ureters cannot be seen. Even if they could be exposed, their catheterization through a highly septic bladder is an unwarrantable procedure.

A few years ago urinary fistulæ were not an uncommon sequel, but with our present technique this is very rare. A fistula is most likely to occur when the cystitis is so severe that liberal and sometimes protracted drainage is an essential part of the treatment. With a reasonably clean bladder the present trend of surgical technique is toward a more thorough closing of the wound, which shortens the convalescence and reduces the danger of fistula to the minimum.

In some instances, owing to the atony of the bladder before the operation, the patient is still obliged to use the catheter after the obstruction is entirely relieved. He has been greatly benefited, because a large sized catheter can be passed without pain, but he naturally feels that the operation is not a perfect success. It is impossible to remedy this condition. It is wise to inform a patient who has led a catheter life for some time that possibly he may be obliged to continue the same after an operation, but it is safe to promise him that catheterization will be much easier and comparatively painless afterward.

Incontinence or dribbling is an occasional sequel after both operations, and is of course due to injury of the sphincter muscles or their nerve supply. The sphincter at the neck of the bladder is always stretched and more or less injured by the upper operation, and special care should be exercised during this operation not to tear it. In the lower operation the sphincter of the bladder is not in so much danger, but the accelerator urinae muscle about the membranous urethra, which has an important sphincter action, is very liable to injury. To avoid this, entrance into the urethra should be made at the apex of the prostate, through the prostatic urethra. Incontinence is the sequel which makes the patient feel that the operation has done more harm than good. He forgets that he has been relieved from pain and thinks only of his present affliction, which makes him a nuisance to himself and to everyone around him. This is a most distressing sequel, and every precaution should be exercised to prevent it, for it is practically incurable when once established.

In conclusion, the writer wishes to state that he is an optimist and believes that the present day prostatectomy is one of the most beneficial operations at our command; but he feels that the number of failures and sequels are too numerous, and this leads to the question if less radical measures may not be better, such as removing the middle lobe by instrumental means, as suggested by Young, or removing the middle lobe and stretching the prostatic urethra through a suprapubic opening, as practiced by Siter of Philadelphia. Siter's suggestion is surely worthy of consideration, because his large experience has led him to conclude that dilatation is accompanied by practically no complications and sequels, and is followed by most satisfactory results.

NITROUS OXIDE AND OXYGEN ANÆSTHESIA[1]

Observations in 2500 Cases

By E. M. PRINCE, M. D., Birmingham, Alabama

THE question of the selection of an anæsthetic continues to be of first importance to the surgeon of to-day who endeavors to give to those seeking his skill the best of everything connected with the art of surgery. All realize that the question of the best anæsthetic in all cases is far from answered. It is only by the comparison of series of cases under one kind of anæsthetic, and only when many thousands have been given, that one can draw any conclusions. Many thousands may be anæsthetized by one anæsthetic agent before we are able to find out its real dangers or advantages.

The post-operative effect on the patient, together with his condition when the anæsthetic was begun, should be taken into consideration. We might have a very high death rate on the table in cases whose condition was exceedingly grave when the anæsthetic was begun, while on the other hand a more dangerous anæsthetic agent might show a decidedly lower mortality if given in cases whose resistance was about normal. It would be very unfair to condemn the anæsthetic, and hold it wholly responsible for the death, unless all conditions were taken into consideration. On the other hand, when a death occurs while the patient is on the operating table, whether the operation is under way or not, unless very conclusive evidence to the contrary can be produced, the anæsthetic should come in for its share of responsibility.

If we are overenthusiastic as to the virtues of one anæsthetic agent, we can ofttimes find some cause other than the anæsthetic for the accident, such as status lymphaticus, etc.

While I would not like to say that the anæsthetic under discussion (nitrous oxide and oxygen) will ever be the anæsthetic of choice for the majority of surgeons — for there are quite a few disadvantages that require time and patience to overcome — still I believe its administration in 1000 cases in which the resistance had been greatly reduced by disease will show a mortality rate so favorable to this anæsthetic that one would hesitate to use any other.

SELECTION OF CASES

The very old, the very young, patients who have any cardiac complications, and the very large, robust subjects, are said to be unfit for nitrous oxide and oxygen anæsthesia. The very old are the cases in which this anæsthetic is used to the greatest advantage. Their tendency to lung complications, the usual nephritis in these old people, and the desire to make their post-operative condition as comfortable as possible, render this anæsthetic the ideal one in these cases. The objection advanced by some that "the blood pressure is elevated, making the aged more likely to cerebral apoplexy," will not hold good, as this can be prevented by giving enough oxygen. We can operate on these patients using 8 per cent oxygen, or in the same cases give 12 to 15 per cent, and the patient will sleep as nicely under the latter as the former proportion. They can be gotten out of bed much earlier, as they seldom go through the prolonged stage of nausea and vomiting seen after ether.

Those cases presenting cardiac complications do not show the rise in blood pressure if there is sufficient oxygen given, and would certainly do as well under the gas-oxygen as under ether. We have taken the blood pressure in many of these cases while they were under the anæsthetic and found it varies very little from what it was before the anæsthetic was begun. I have never used nitrous oxide and oxygen in children under three years of age, but I find a child of this age and over does extremely well. The very large, robust subject is as easy to anæsthetize with nitrous oxide-oxygen as the smaller. It does

[1] Read before the New York Academy of Medicine, November 4, 1912.

not seem to require any more of the gas than in the smaller subject to produce surgical anæsthesia. A great deal depends on the individual patient.

PREVIOUS HABITS OF THE INDIVIDUAL

The man who has been a constant and hard drinker is a very unfavorable subject for any kind of anæsthetic, although I think he takes the nitrous oxide and oxygen equally as well as he takes ether, provided a preliminary of scopolamin and morphin is given him. In many of these cases we experience no trouble, while in others we have the same struggling seen in almost all of these drinkers when ether is the anæsthetic agent.

The morphin habitué is also a harder subject to anæsthetize with nitrous oxide and oxygen than one who is not addicted to the drug. One with a nervous tendency will take the anæsthetic as easily, but I do not think the pulse will run as smoothly under the anæsthetic as one who is not easily excited.

The dark-skinned race is one that requires the most careful watching on the part of the anæsthetist, because the cyanosis is not so readily seen in these cases, and in the negro it cannot be seen at all. My anæsthetist, Dr. Dawson, informs me he is governed in these cases entirely by the pulse rate and respiration.

In these the average per cent of oxygen is also commenced with and the amount then varied according to the requirements of the individual case.

CONDITIONS DEMANDING NITROUS OXIDE-OXYGEN

Cases in which this anæsthetic is especially indicated are those suffering with lung and kidney complications, those in which we have a very low hæmoglobin, and those that are extremely septic. No one who has followed the investigations of such men as Crile, Hamberger, and Ewing, and many others, could think of suggesting any other anæsthetic where we have a grave nephritic complication in a case where surgery is a necessity. There are absolutely no ill effects ever seen following this anæsthetic in these grave cases. In our normal cases we find more urine excreted during the first 24 hours after nitrous oxide-oxygen than for the same length of time following ether. We never have albumin following the use of this anæsthetic, which is not the case where ether is used. To the tubercular patient, whose lungs are already waging a desperate battle against the invading organism, nitrous oxide-oxygen is certainly a godsend. These patients are not hastily operated upon, but ofttimes we are compelled to resort to surgery, where their already desperate condition is complicated by some other infection more dangerous. The irritating action of ether on the lung tissue in these cases is perhaps just sufficient to turn the tide in favor of the disease. The post-operative pneumonia following ether is never seen where nitrous oxide and oxygen are used. In the very septic cases, and those whose hæmoglobin has been greatly reduced by continuous bleeding, nitrous oxide and oxygen certainly give the patient the better chance of recovery. It has been shown that hæmolysis never follows the use of nitrous oxide and oxygen anæsthesia, nor is the hæmoglobin reduced. This cannot be said to be the case after other forms of anæsthesia. These infected patients are fit subjects for shock, but are rendered less liable to it, as it has been proven that a patient is not so susceptible to shock under this anæsthetic as under any other.

PREPARATION OF PATIENT FOR OPERATION

The patients are prepared in the usual manner in most respects, such as cleansing of the bowels, the deprivation of food for 12 hours, and it is best that no water be given to the patients during the hour preceding the operation, as this will render them less likely to regurgitation while on the operating table.

PRELIMINARY MEDICATION

The usual preliminary given by me before operation is morphin sulphate gr. 1/8 to 1/4, atropin sulphate, gr. 1/100, and strychnin sulphate gr. 1/30. In subjects that have been hard drinkers, scopolamin, gr. 1/200 to 1/100 will prove an aid to the anæsthetic. In many cases this preliminary medication is unnecessary, and I have given over 300 without using

any preliminary whatever. No morphin should ever be used before operating on children, as it is unnecessary, and as a rule children bear an opiate poorly. I was recently taken severely to task by one who by reputation as an anæsthetist has no superior, and whose good opinion I value most highly, for reporting as nitrous oxide and oxygen anæsthesias those cases in which we had given a preliminary of morphin gr. 1/8 to 1/4, he stating that none of these were nitrous oxide and oxygen anæsthesias, but should be classed as morphin, nitrous oxide and oxygen anæsthesias. I do not agree with anyone in this stand, as the morphin is not an essential part of the anæsthetic, nor is morphin considered an anæsthetic agent. It is used to render the patient a better subject for its administration, just as we use restriction of food and other measures.

One of the most important functions of the preliminary of morphin is its anodyne effect; as the patient awakens so quickly the pain would be quite severe were it not for this preliminary. In children, camphorated tincture of opium may be given just before operation, and may be continued afterward, as vomiting is so seldom seen in children after this anæsthetic.

ADMINISTRATION

No one should be permitted to administer nitrous oxide and oxygen unless he be well trained in the work or is giving it under a suitable instructor. This will never be the routine hospital anæsthetic to be given by the internes. It will always require one who has devoted time and thought to the question of anæsthesia in general, and this form in particular. The surgeon should employ one trained anæsthetist who is permitted to administer every anæsthetic for him, as in this way he will become more efficient in the work.

The trained anæsthetist should be paid as every other specialist in medicine, and the surgeon should not desire the services of a specialist at the price of a day laborer. If this special field of surgery were better appreciated and better paid, we would find more competent men seeking to perfect themselves in the art of administering an anæsthetic. The anæsthetist should be a man of pleasing manners and good address, and one selected because of the soundness of his gray matter, not because of the lack of this very essential element. He should be thoroughly familiar with physical diagnosis, and be required to examine every chest before administering an anæsthetic. He is held wholly responsible for the outcome of the anæsthetic, and should be thoroughly familiar with every abnormal condition of the heart and lungs.

APPARATUS

In 1908 we began the use of the Cunningham machine, and have since seen no cause to make a change. The only improvement one could suggest would be to eliminate the ether chamber, so that only a pure nitrous oxide and oxygen anæsthesia could be given. We find many reports on nitrous oxide and oxygen anæsthesia, and after going into the report we will find in as inconspicuous a place as possible that these were given with just "a little ether."

"Just a little ether" will admit of such a large personal equation that one would hardly know how to classify the anæsthetic. It could mean any amount from half a dram to several ounces. This kind of anæsthesia has had a tendency to unjustly subject nitrous oxide and oxygen to much criticism, as the nausea, vomiting, and other unpleasant effects are always in evidence where "just a little ether" is used. The comfort and pleasure associated with the taking of a nitrous oxide and oxygen anæsthesia, where there is no ether added, is one of the strong points in favor of this anæsthetic. This is not the case where ether is used.

Patients who take nitrous oxide and oxygen never dread the second anæsthetic if it becomes necessary, while those taking ether anticipate the second with dread.

Any apparatus in which the gases can be mixed in definite proportions is all that is required. The very large tanks of gas are decidedly preferable to the smaller, as the gas can be made to pass through a gauge, and a constant flow can be maintained into the bags.

REBREATHING

The question of rebreathing of the gases is one which has been much discussed, and there are men whose opinion is certainly worthy of careful consideration who advocate this. The two arguments advanced are that this renders the nitrous oxide and oxygen method much cheaper, and that the CO_2 is a respiratory stimulant. The first is certainly no argument, as the question of cheapness should never be considered when we are dealing with a human life. That CO_2 is a respiratory stimulant has been proven, and in many cases it is extremely useful. It would certainly seem to be far more desirable if we could furnish this respiratory stimulant to our patient in the proportion we wish than to depend on our patient manufacturing the CO_2, if a respiratory stimulant is required. I do not think anyone will contend that the other products of expiration would be an advantage. If so, then our mode of constructing buildings is all wrong. We have always endeavored to so construct and ventilate our public buildings and bedrooms that rebreathing might be eliminated. We can easily dispense with rebreathing if we desire to give an anæsthetic free from all poisonous products by adding to our machine a small tank of CO_2. This is manufactured by the same concern which manufactures the other gases. I have during the past year used this method of stimulating the respiration where a respiratory stimulant was demanded, and it has proven very satisfactory indeed.

Other questions to be considered are whether or not it is dangerous to permit patients to breathe from a gas bag into which other patients have breathed, many of whom may have been tubercular. This would certainly seem to be a very excellent medium through which the disease might be communicated, and I am quite sure none of the enthusiastic advocates of rebreathing would look forward with pleasure to breathing from the same bag into which a tubercular patient had just exhaled. I do not think the bags, tubes, and machine can well be sterilized after each operation, as the bags I have seen would not bear boiling, which is the only sure method of sterilization.

COMPLICATIONS AND ALARMING SYMPTOMS ON THE TABLE

The greatest danger from a nitrous oxide and oxygen anæsthesia is failure of respiration. This can in most cases be overcome by the careful watching of the respiratory excursion, and the giving of the proper percentage of oxygen and CO_2. One can cause his patient to breathe just as he desires by the use of the carbon dioxide gas. Often, before we began the use of the carbon dioxide, we would have a suspension of respiration, which would be easily overcome by giving a light blow over the epigastric area.

The heart does not seem to be in the least affected if plenty of oxygen is given. If we permit the patient to become cyanotic, the pulse rate is decreased; or if he come too far out from under the anæsthetic, the pulse rate is at once increased.

POST-OPERATIVE COMPLICATIONS

I think it is the accepted conclusion of those who have devoted any study to this form of anæsthesia that we have none of the post-operative complications so often seen after ether and chloroform.

MORTALITY

No one will deny that there is a mortality rate to nitrous oxide and oxygen anæsthesia. What that rate is I do not think we can say until many more thousands have been given.

I think, however, that many of the deaths reported should not be charged against the anæsthetic, and this agent condemned, for it is often administered by one who knows nothing of this anæsthetic, and more frequently they are mixed anæsthesias, and not nitrous oxide and oxygen at all.

In the giving of several poisons it is unfair, should evil result, to select one and lay the entire blame to it, when the symptoms and death could as easily be induced by any one of the agents used. In a recent correspondence relative to a death in which ether and nitrous oxide and oxygen were given, the anæsthetist maintained that, the death being due to paralysis of respiration, it was of necessity a nitrous oxide death. I note the report of a death from ether anæsthesia by the late

Maurice H. Richardson. Had nitrous oxide and oxygen been used in conjunction with the ether, I am quite sure it would have received credit for this death, as it was from paralysis of respiration. Artificial respiration was performed for 21 hours, but never during this time did the patient make any effort to breathe. While the artificial respiration was performed the patient remained pink, but the moment it was discontinued she began to grow cyanotic.

ADVANTAGES OF NITROUS OXIDE AND OXYGEN ANÆSTHESIA

1. Rapidity of action.
2. Lack of unpleasant sensations to patient.
3. Absence of post-operative complications.
4. Reduction of post-operative vomiting.
5. Absence of blood changes.
6. Lessened liability to shock.
7. Rapid return to consciousness.
8. Lack of dread should future anæsthetic be demanded.

In briefly discussing the advantages of a properly administered nitrous oxide and oxygen anæsthesia, (1) the rapidity with which the patient assumes the unconscious state is very desirable, and he does not have the ten minutes or more of the irritating action of ether on his air passages. I note that some of the gas-oxygen anæsthetists state they have the patient ready for operation in thirty seconds. This is surely a mistake, and will often be accompanied by marked cyanosis. It is best, in my opinion, to take at least three or four minutes to get your patient thoroughly anæsthetized, and he will be a much better subject for operation than where he is hastily "pushed under" the anæsthetic. (2) He does not have any unpleasant sensations, regardless of the manner of administering the gas. I have given this anæsthetic to many doctors, and they all say the sensation of going under the gas is very pleasant indeed. They usually report having very extensive dreams, but can seldom recall of what they dreamed. (3) The absence of post-operative complications is very noticeable. I have never seen a case of pneumonia or nephritis follow the use of nitrous oxide and oxygen. (4) The post-operative vomiting is greatly reduced in frequency, and the prolonged vomiting quite frequently seen after ether or chloroform is never seen. If the patient is placed in the Trendelenburg position he will quite frequently regurgitate water and gastric juice while on the table. (5) Absence of blood changes has been worked out by Hamberger and Ewing.

In those patients who are so profoundly septic we do not so often find shock present, and there is never the rapid march to a fatal termination which is so often seen following ether. They rapidly return to consciousness, and are in much better condition to fight the infection than they would be if there had been added to their already poisoned condition another toxic element. Any surgeon who has ever found it necessary to again operate on a patient is familiar with their great dread of again taking ether. In most cases this is far greater than the dread of the second operation.

DISADVANTAGES

1. The necessity of a trained anæsthetist for this class of anæsthesia.
2. Cost of the anæsthetic agent.
3. Rigidity and movement in some cases.

Under disadvantages one would place first the necessity of a trained anæsthetist, but I doubt if this should be done, as the same might apply to the art of surgery. One never hears that the great disadvantage attending a grave surgical operation is that it requires a trained surgeon, or that the great disadvantage in the management of a case of typhoid fever is that it requires a trained physician. It is taken for granted that the latter two should be trained, and the same should apply to the former. The rigidity of the muscles and movements of the patient is sometimes annoying to the surgeon, but in a great many of these cases if the surgeon will exercise patience the anæsthetist can get the subject more deeply under the anæsthetic, so that a difficult ligation or other procedure can be more easily accomplished.

One point of interest is if these movements are due to the pain from manipulation, and if it is harmful to the patient. All patients will tell you they felt no pain during the opera-

tion, though they may have shown signs of pain during its progress. A point worth considering is that one may have a nerve extracted and other painful dental work done while taking a very slight amount of gas, and they will feel no pain, although they will obey the command to spit the saliva from their mouths. Again, Dr. Dawson has used this quite extensively in obstetrical work; and the patients will say they recall quite well when the child was born, but felt no pain at its birth. It would seem if there is no pain under so slight an anæsthesia, there would be none if the anæsthesia were pushed beyond this stage. I have seen no evil results following in those cases where the patients were not thoroughly relaxed and moved, but it is much more difficult to perform the operation.

Having used this anæsthetic during the past five years, and observed its administration in 2500 cases, I feel I know something of its good and bad qualities; but I fully appreciate how far from settled is the question of the best method of producing anæsthesia at the present day. We find the surgical world is becoming more interested in this very important field, and it is to be hoped that at no very distant day this question may be answered.

CONCLUSIONS

1. That this anæsthetic may be administered in all cases where a general anæsthetic is required. I would not presume to say it is the best in all cases.

2. That it may be used without the addition of ether, or without the preliminary of morphin.

3. That most adults take the anæsthetic easier and are better subjects for the operation if a preliminary of morphin, gr. 1/4, and atropin, gr. 1/100, is given.

4. That children should never be given morphin before operation.

5. That the recoveries in patients suffering with severe septic infections are much greater when this anæsthetic is used.

6. That we do not have any post-operative complications when this anæsthetic is used.

7. That it should never be given except by one thoroughly trained in this work.

ANÆSTHESIA AND ANOCI-ASSOCIATION[1]

By GEORGE W. CRILE, M. D., Cleveland

PRINCIPLE: The nerves, whether of the special senses or of common sensation, are fuses, which when ignited (that is, stimulated) cause release of energy in the magazine (the brain cells). Inhalation anæsthesia puts to sleep only a portion of the brain; if all of the brain were anæsthetized the patient would be dead. Now the vast army of awake brain cells respond actively to the trauma of operation. This response, or release of energy in the brain cells, is an effort to escape from injury, and this release of energy is not prevented by inhalation anæsthesia. The stored energy of the brain cells is therefore consumed during surgical operations or during psychic strain. The prevention of this consumption is one of the great outstanding problems of operative surgery. Obviously the only practical method of preventing the consumption of this stored energy of the brain cells is the development of a new principle of operative surgery, the practice of which will exclude from the brain the stimuli of the special senses and the stimuli of common sensation.

This is the principle of anoci-association, meaning the exclusion of all nocuous or harmful associations or stimuli.

There is not a single anæsthetic that will exclude all nocuous or harmful stimuli from the brain. Local anæsthetics, by blocking nerve conduction, protect the brain from local operative injury, but they do not protect the brain against destructive psychic strain.

[1] Read before the Clinical Congress of Surgeons of North America, New York City, November 12th, 1912.

Fig. 1. Fig. 2. Fig. 3. Fig. 4.

Fig. 1. Infiltration of skin and subcutaneous tissue with $\frac{1}{400}$ novocain.
Fig. 2. Infiltration of fascia and muscle.
Fig. 3. Infiltration of posterior sheath and peritoneum.
Fig. 4. Peritoneum inverted. Infiltration with ½ per cent of quinin and urea hydrochloride.

Inhalation anæsthetics exclude the psychic stimulation of the brain cells, but do not exclude the operative stimulation. Anæsthetics introduced hypodermically are excluded on principle. Each anæsthetic covers only a part of the field; each has its advocates, but there is no single agent that alone can produce anoci-association, which is the goal of operative surgery. We therefore do not advocate ether alone, nor chloroform alone, nor nitrous oxide alone; we do not advocate local anæsthesia alone, nor morphin and scopolamin alone, nor spinal anæsthesia alone; but through selection and combination of the various anæsthetics, we aim to exclude on the most favorable terms all stimuli from the brain.

The description of this technique will be limited to abdominal and exophthalmic goiter operations, which will serve to illustrate the principle.

ABDOMINAL OPERATIONS

1. Excluding infancy, old age, and depressed vitality, we first administer, as an average, $\frac{1}{6}$ grain of morphin and $\frac{1}{150}$ grain of scopolamin one hour before operation.

2. If local anæsthesia alone is employed, novocain in $\frac{1}{400}$ solution is used by progressive local infiltration.

3. If inhalation anæsthesia is employed, we then administer nitrous oxide, either alone or with ether added as required.

4. As soon as the patient is unconscious, infiltration, first of the skin and then of the subcutaneous tissue, with $\frac{1}{400}$ novocain is made. In order to spread the novocain, immediate local pressure with the hand is applied. Anæsthesia is immediate. Incision through this anæsthetized zone exposes the fascia. The fascia is then novocainized, subjected to pressure, and divided. This brings us to the remaining muscle or posterior sheath and to the peritoneum. These structures are then infiltrated with novocain, subjected to pressure, and divided within the blocked zone. If blocking has been complete, upon opening the abdomen no increased intra-abdominal pressure will be found, no tendency to expulsion of the intestines, and no muscular rigidity.

5. The peritoneum is everted and infiltrated with ½ per cent solution of quinin and urea hydrochloride completely surrounding the line of proposed sutures and momentary pressure is applied. This infiltration serves as a block, and as it lasts several days it should prevent or at least minimize the post-operative wound pain and the post-operative gas pains, and by so much minimize post-operative shock.

6. The relaxed abdominal wall will permit the gentle and easy exploration of the entire abdominal cavity. If there is no cancer in the field of operation and no acute infection, the following regions may be blocked as completely and in the same manner as the abdominal wall, viz.: the meso-appendix, the base of the gall-bladder, the uterus, the broad and the round ligaments, and any portion of the parietal peritoneum. Operations on the stomach and intestines made without pulling on their attachment cause no pain, hence require no novocain block. Quinin and urea causes

a certain amount of œdema of tissue, which lasts for some time after the wound is healed.

The closure of the upper abdomen is then as easy as the closure of the lower — all is done with the ease of relaxation. What is the result? No matter how extensive the operation, no matter how weak the patient, no matter what part is involved, if *anoci* technique is perfectly carried out the pulse rate at the end of the operation is the same as at the beginning; the post-operative rise of temperature, the acceleration of the pulse, the pain, the nausea, and the distention are minimized or wholly prevented.

GRAVES' DISEASE

I believe everyone will agree that a technique that can carry an advanced exophthalmic goiter case through operation without increasing the pulse rate can even more readily do as much for any other operation. This can be done by the following technique, the operation being either ligation or lobectomy.

If ligation is made, it is performed without removing the patient from his bed. In performing ligation nitrous oxide may or may not be administered; but a complete local blocking with novocain is always employed during operation as is also a complete quinin and urea hydrochloride infiltration at the close of the operation, thereby blocking the entire raw field of operation.

If lobectomy is to be performed, the patient is anæsthetized with nitrous oxide in his own room; fictitious anæsthesia having been daily given for several days previous to the operation, the patient is anæsthetized free from psychic strain, being under the impression that he is receiving an inhalation treatment. When under anæsthesia the patient is taken to the operating room. The division of tissue is preceded by a complete blocking, so that no activating impulse can reach the brain. Before closing, quinin and urea hydrochloride is infiltrated into every part of the raw field with a hypodermic needle. The patient is kept unconscious, under anæsthesia, until returned to his room, put to bed, and his room restored to its previous condition. In the course of the cycle from his room to operation and return, the brain has received

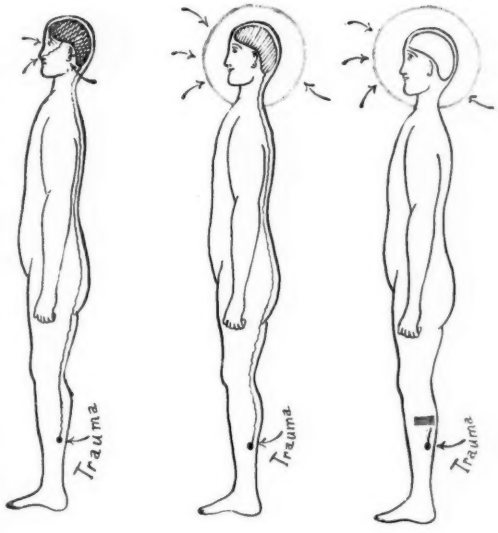


Fig. 5. Anoci-association diagram. 1. Auditory, visual, olfactory, and traumatic noci impulses reaching the brain. 2. Auditory, visual, olfactory associations excluded. 3. Nerve blocked by cocain; patient in anoci-association.

no activating stimuli so there can be and there is no change in the pulse.

The immediate control, however, is not the end of the benefits. The post-operative hypothyroidism is prevented or minimized and to the same extent that the immediate results are improved so are the later clinical results improved.

What happens to a case of Graves' disease not under surgical treatment when subjected to a severe psychic shock — to a heavy strain or to deep worry? The disease is aggravated for weeks or for months, and not infrequently death results. The stress of facing the operating room is not only immediately seen, but is perpetuated in the following days and weeks and months by its frequent recall. From this handicap the *anoci* patient is free, and by so much is the convalescence sped on its way.

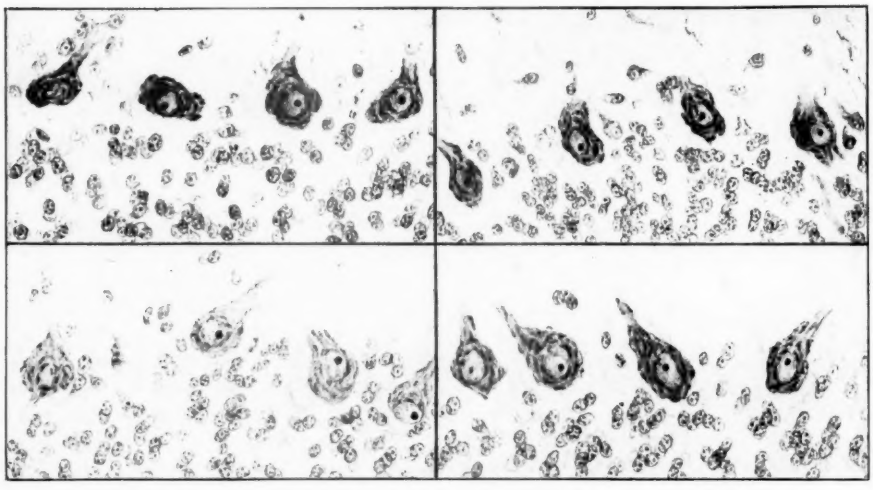
SUMMARY

1. The technique of surgery the world over is now well standardized.

2. One of the greatest outstanding problems is the elimination of the harmful effects of the

CEREBELLUM

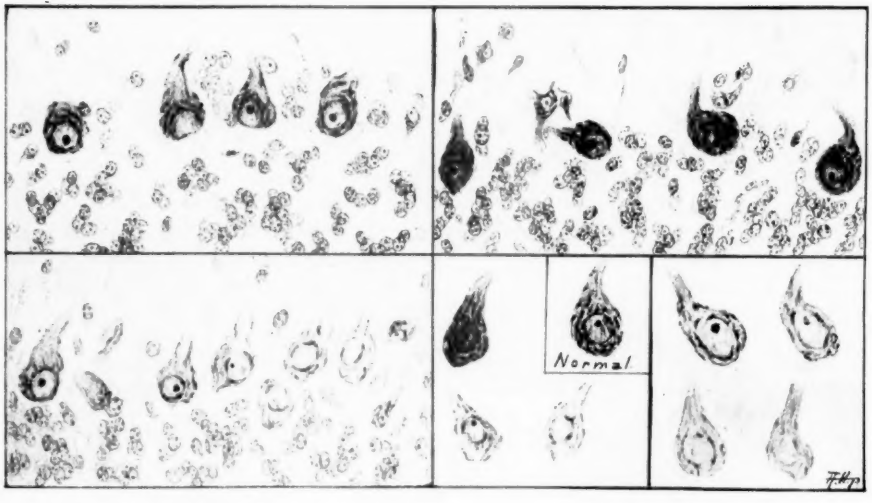
Normal dog. Anoci. shocked dog. Cerv. cord severed.



Shocked dog. Ether anæsthesia. Shocked dog. N_2O anæsthesia.

CEREBELLUM

Normal rabbit. Rabbit. Fright.



Rabbit two hours after fright.

Characteristic changes in brain cells in fright. Hyperchromatic during fright. Exhausted after fright.

Characteristic changes in brain cells in shock. Note swelling and rupture of nucleus and nist-bodies.

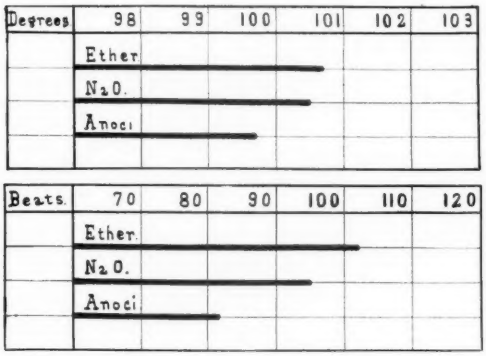


Chart 1. Abdominal hysterectomy. The temperature: Each heavy line represents the average 5.00 p. m. temperature of ten patients during the first four days after operation. The pulse: Each heavy line represents the average 5.00 p. m. pulse rate of ten patients during the first four days after operation.

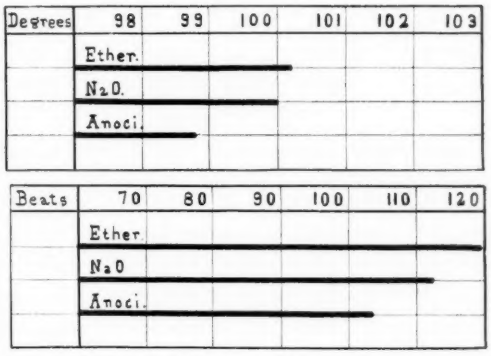


Chart 2. Thyroidectomy. The temperature: Each heavy line represents the average 5.00 p. m. temperature of ten patients during the first four days after operation. The pulse: Each heavy line represents the average 5.00 p. m. pulse rate of ten patients during the first four days after operation.

necessary surgical procedure, including the anæsthetic, thus further diminishing the post-operative morbidity and mortality.

3. These harmful effects are now known to be due to exhaustion of the brain cells from psychic and traumatic stimulation.

4. These traumatic stimuli reach the brain and cause discharge of brain cell energy under inhalation anæsthesia.

5. This brain cell activity is accomplished through oxidation.

6. Nitrous oxide owes its anæsthetic properties to its interference with the use of oxygen by the brain cells, hence nitrous oxide by so much protects the brain cells during a surgical operation by diminishing the oxidation, and hence the destruction of the chemical compounds in which is stored brain cell energy.

7. Powerful stimuli, whether psychic or traumatic, whether received by the brain while awake or, in case of the traumatic stimuli, whether received under inhalation anæsthesia, cause a lowering of the threshold to stimuli. This lowering of the threshold is the source of the nervousness, irritability, and altered personality which so frequently follow operation.

8. The principle of *anoci* is the exclusion of all harmful stimuli.

9. The practice of *anoci* requires careful personal management united with the use of such chemical agents as, combined, will exclude from the brain all harmful stimuli, thus taking the brain and the personality of the patient unmodified and unimpaired through the operations.

Chart 3. Mortality rate per thousand of operative cases from Lakeside Hospital.

10. The patient is kept safely and agreeably nuconscious while the operation is performed under local anæsthesia.

CLINICAL RESULTS

The clinical results here reported have been confirmed by Bloodgood in his personal experience. The accompanying charts show the results of a critical study of the clinical data of parallel series of operations performed by me, viz.: the last consecutive operations under ether alone, under nitrous oxide alone, and under *anoci*. Were it possible to express the subjective sensations of the patient, the contrast would certainly be even more striking. My associate, Dr. W. E. Lower, and I during the past year performed 629 abdominal sections, under anoci association with a mortality rate of 1.7 per cent.

INVERSION OF THE UTERUS

With Report of a Case Occurring During the Puerperium and Caused by a Fibroid[1]

By WALTER CLINTON JONES, A. M., M. D., Chicago
Assistant Professor of Surgical Pathology, Medical Department, University of Illinois

THE following case occurred in the experience of the writer and led him to a special study of this condition.

Patient, Mrs. T. J., age, 42 years. General health, good all her life. She had borne eight children, no particular difficulty having occurred in any of the labors. Her last child was born about June 30, 1912. Pregnancy and labor were normal and the puerperium uneventful till the end of the second week after delivery. She was allowed out of bed on the tenth day. On the fourteenth day she began to have moderately severe pelvic pains, a pressing down sensation in the pelvis and dysuria. Not until these symptoms had continued for a few days did she call in her family physician, Dr. E. C. Hamilton. He took her at once to the local hospital, and upon examination found a mass of indefinite shape almost filling the vagina. There does not seem to have been much hæmorrhage.

The patient being rather weak, he waited until the next day before attempting to do anything radical. The following morning, he gave her an anesthetic and removed the vaginal mass, cutting through its base as high up in the vaginal vault as possible. This procedure left an opening into the peritoneal cavity, through which the omentum prolapsed. This accident was controlled and the patient was put to bed. The vaginal mass turned out to be the corpus uteri and a large intrauterine fibromyoma attached to the fundus by a broad base.

All was well till the tenth day, when the patient began to show a moderate temperature. At this juncture, July 30, 1912, the writer was called to see the patient for the first time. Vaginal examination revealed the vagina empty and a cervix dilated about three quarters of an inch. Bimanually, in the median line, a mass was palpable, spheroidal in shape, indefinite in outline, rather soft in consistency and apparently about 3 inches in diameter. I diagnosed her original trouble as inversion of the uterus and her present illness, pelvic infection.

I did a laparotomy at once and removed the right tube (the left one had been removed with the vaginal mass), both ovaries and a piece of omentum nearly as large as a hen's egg. All of these structures were matted together capping the cervical stump with an inflammatory mass, in the center of which was an abscess cavity containing about 3 ounces of pus. Drainage was accomplished with iodoform gauze, both abdominally and vaginally. The patient got along very well for about a week, when she began to have temperature and local evidence of retention of pus. I then dilated the cervix with the index finger, thus facilitating drainage. Her condition improved at once and she ultimately made a complete recovery.

PATHOLOGICAL ANATOMY

Gross. The specimen (Figs. 1 and 2), when I first saw it had been preserved in formalin solution. It consists of an upper portion the corpus uteri, and a lower part, the tumor, which is connected with the fundus of the uterus by a broad pedicle. The body of the uterus is about 9 cm. in diameter and the tumor, about 10 cm. The length of the whole specimen is about 20 cm. It weighs one pound and six ounces. The serous surface is perfectly smooth and glossy but thrown into folds on account of the lessened area it has to cover. The mucous surface is smooth but not glossy, though under tension on account of being stretched over an area larger than normal. The left tube is attached to the inner or serous surface and is entirely normal in appearance, while hanging from it near its distal end is a small cystic hydatid of Morgagni.

The uterus is light in color and very firm in consistency, while the tumor is of a darker hue and a little softer. The thickness of the wall of the uterus is about 3½ cm. and the wall of the tumor, about 2 cm. In the interior of the tumor is a cavity which in the fresh specimen must have been spheroidal in shape and large enough to contain 5 or 6 ounces of fluid. At the most dependent portion of the tumor is an opening into this space, irregular in shape and about 1¾ cm. in diameter. The surface of this cavity is somewhat irregular in contour, presenting in places a smooth surface, in other areas, indentations, due very likely to shrinkage of the tissues in the formalin solution. In

[1] Read by invitation before the Chicago Gynecological Society December 20, 1912.

numerous spots, tags and shreds are hanging to the surface; at the outlet of the tumor cavity, these tags are large and numerous and hang downward, forming a tuft.

Microscopical. The diagnosis of the tumor is typical degenerated fibromyoma. The fibrous tissue is more abundant than the muscle cells, and the degeneration is rather large in amount and diffuse in its distribution.

This inversion is unique in that it had a double origin, a gynecological and an obstetrical. The tumor alone very likely would not have produced the inversion, for very few uterine tumors, even when submucous or intrauterine, cause this trouble; but after the uterine wall was softened by pregnancy and relaxed by a labor, the weight of the tumor became effective in pulling down the fundus. On the other hand, this case is not unique

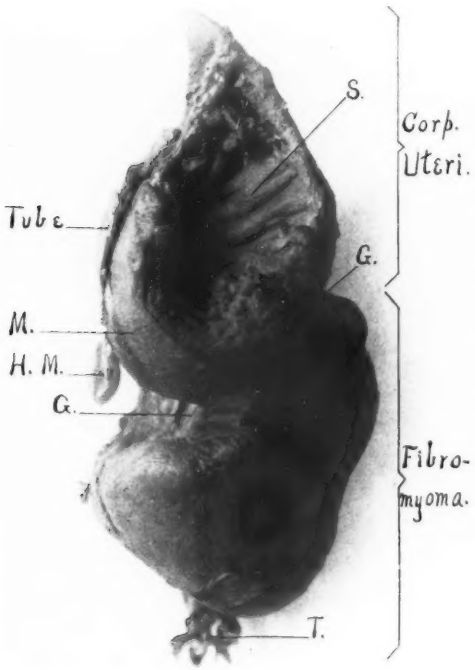


Fig. 1. Photograph of gross specimen of inversion of the uterus; writer's case. G, groove between tumor and uterus. H M, hydatid of Morgagni. M, mucous surface of the uterus. S, serous surface of the uterus. T, tags of tissue at outlet of tumor cavity.

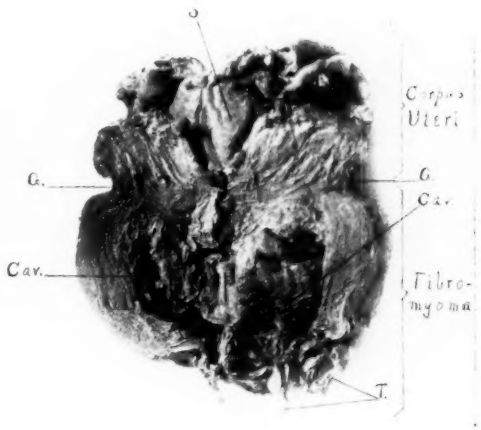


Fig. 2. Same as Fig. 1, showing cut surface after longitudinal incision. Cav., cavity of tumor. G, groove between tumor and uterus. S, serous surface of uterus. T, tags of tissue at outlet of tumor cavity.

but is like a large proportion of the reported cases in that the occurrence of the accident was unforeseen and could not have been avoided. The fibroid never had caused a single symptom; the labor was entirely normal; and the inversion produced such mild symptoms while it was taking place that a doctor was not called until the fundus was in the vagina. Also, the situation of this tumor at the fundus is perfectly typical; for, according to Thorn, nearly 90 per cent of fibroids which cause inversion are in this location.

In consulting the reports of several hundred cases in the literature, the writer finds only two instances in which the inversion was due to a tumor and occurred also during the puerperium. Patrick of Montreal, in 1908, described such a case from his own practice, in which the inversion probably occurred gradually from the fifth to the twentieth day of the puerperium. Tracy (1911) also describes a case of his own of 14 years' standing, which was due to an intramural fibroid in the fundus and which had developed during her last puerperium.

Pench has collected five instances from the literature in which the uterus was removed through mistaking it for a tumor. One of these patients died.

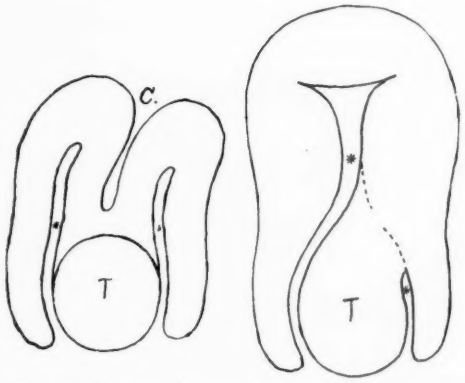


Fig. 3. Diagram of incomplete inversion of the uterus caused by a submucous fibroid situated near the fundus and simulating an intrauterine polyp without inversion. C, cup-like depression on the peritoneal surface. T, tumor. Note the shortened intrauterine cavity (*). Compare Fig. 4, in which the findings at the external os are precisely similar.

Fig. 4. Diagram of an intrauterine fibroid without inversion, from a recent patient of the writer's. T, tumor. Note the elongated intrauterine space (*). Compare Fig. 3, in which the findings at the external os are precisely similar.

Etiology. The following outline gives briefly and approximately in the order of their importance the causes of inversion of the uterus.

A. Obstetrical in Origin

I. *Primary cause.*
   1. Relaxation of uterus.

II. *Secondary causes.*
   1. Pressure on fundus from above or traction from below.
      a. Traction on cord (including short cord or cord wound around baby).
      b. Credé expression of placenta.
   2. Any factor favoring uterine inertia.
      a. Prolonged labor.
      b. Hydramnion.
      c. Multiparity (?).
      d. Constitutional diseases, etc.
   3. Age.
      a. 20–30.
   4. Idiopathic.

B. Gynecological in Origin

I. *Tumor.*
   1. Usually submucous or intrauterine fibroid.
   2. Age: After 30.

II. *Idiopathic.*

In 1911, Thorn, in what is probably the most exhaustive research of the literature that has ever been published in the history of this subject, reported 641 cases gathered from the entire civilized world and covering a period of 22 years prior to 1911. Of these, 521 (81.2 per cent) were obstetrical (full term) in origin: 83 (13 per cent) were due to tumors of the uterus; 14 (2.2 per cent) occurred post-mortem; 13 (2 per cent) he classified as idiopathic; and 10 (1.6 per cent) occurred after abortions or premature labors. From these statistics it is evident that a discussion of this subject centers around the obstetrical instances, as this class outnumbers so greatly all others. In this group, according to Moran, inversion happens with about equal frequency before and after the delivery of the placenta. It may occur during the delivery of the baby (Barnes and Chittenden).

The following statistics will give one an idea of the rarity of this accident.

Von Braun	1 case in 250,000 labors
Madden	1 case in 190,800 labors
Cache	1 case in 4,600 labors
Winckel	0 case in 20,000 labors
Beckman	0 case in 250,000 labors
Aveling	1 case in 100,000 labors
Hirst	1 case in 140,000 labors
Kehrer	1 case in 2,000 labors
Schönbeck	2 cases in 1,500 labors
Krassowsky	1 case in 200,000 labors
Average	1 case in 128,767 labors

There is some doubt, in regard to some of the above statistics, as to whether they refer to inversions of all degrees or to complete ones only. Furthermore, the above table is compiled from hospital reports and hence, Mériel and others hold, is misleading, because this accident, they maintain, is relatively more common in private homes. Hinchey, upon examination of the mortuary reports of St. Louis and after a search of the literature, concluded that this accident is more common than is usually supposed. Thorn expresses the same opinion.

In searching for the etiology proper of uterine inversion, one need not go far to discover that the great underlying cause of all acute (obstetrical) cases is *relaxation of the*

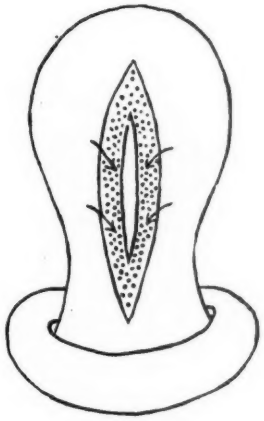


Fig. 5.

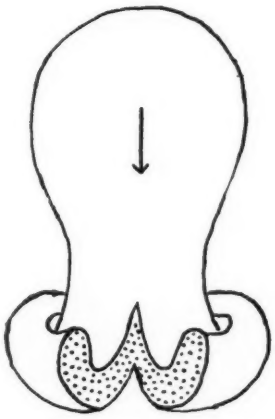


Fig. 6.

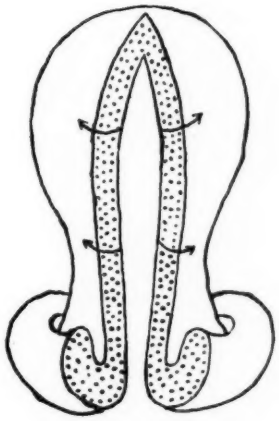


Fig. 7.

Fig. 5. Diagram showing the uterine incision in the posterior wall in the operation of Browne and of Küstner. In the former method, the cervix is dilated through this incision; in the latter, the cervix is reached through a posterior colpotomy and the uterus is turned inward through the uterine incision, as indicated by the arrows. (Modified from Heinricius.)

Fig 6. Diagram of simple cervical incision, usually made posteriorly. Reduction is accomplished by pressing the corpus in the direction indicated by the arrow. A colpotomy usually is included in this procedure.

Fig. 7. Diagram of the more extensive uterine incision, usually made posteriorly. The inversion is reduced by turning the uterus in the direction indicated by the arrows. A colpotomy is almost always done as a part of this method. Note that this prolonged incision may be made by extending downward the incision shown in Fig. 5 or by continuing upward the one seen in Fig. 6. (Modified from Heinricius.)

uterus. Probably none of the secondary factors which are active during or immediately after labor would ever produce inversion without uterine inertia. Of course, this statement does not apply to gynecological cases, for they are gradual in their development. Although uterine relaxation has been emphasized by Dudley, Ashton, McGlinn, Exchaquet, Mériel, Murphy, Lynch, Baseil and others, yet it will bear repetition here, for there are many who do not seem to appreciate its importance. Numerous writers are vociferous in condemning midwives, especially, and also physicians, for traction on the cord or an "improper" Credé. This, to be sure, is all right as far as it goes, but it does not get at the root of the trouble. Most authorities in obstetrics condemn in general any traction on the cord, but usually recommend Credé's method. As far as anyone knows, either procedure may easily produce inversion, if the uterus is relaxed. Why not, then, lay emphasis watching the tonicity of the uterus and upon the importance of carrying out no procedure whatever upon the uterus or its contents during the second or the third stages of labor (except in emergency), unless the uterus is firmly contracted? If this rule were observed, many cases, perhaps half of them, would be prevented. In 100 tabulated cases, Vogel found in 47 instances that traction had been exerted upon the cord, while Thorn cited 11 cases in which the cord either was short or was wound many times around the body of the baby. Funic traction probably is more common as a secondary cause of inversion than is pressure upon the fundus.

There remains, however, a large number of instances which seem at present to be entirely unavoidable. I refer to those that occur during or immediately after a normal or approximately normal labor which has been conducted according to the most thoroughly approved methods. In these patients, the accident occurs suddenly and without warning, once in a while even without symptoms (Barrows and others); and the fundus is down in the vagina before there is any possible chance to prevent the inversion. For the present, at least, we must call these instances

spontaneous. In 100 acute cases, Beckman found 54 to be of this nature. Of 437 postpartum inversions, Thorn finds that 145 were produced by violence, 180 were spontaneous, and that in 103 the cause was undetermined. Thus, in 334 cases in which the cause could be ascertained, *54 per cent were spontaneous.* The blame in these instances lies, not in the fact that the inversion has occurred, but in the failure to make an early diagnosis and in neglecting to replace the uterus at once. In the cases where diagnosis and reposition have been accomplished immediately, both the morbidity and the mortality have been very low.

In considering the secondary causes of this condition, it is by theoretical considerations rather than by practical deductions that one places among the causes of this accident those factors which usually are accepted by obstetricians as predisposing to uterine inertia, for example, multiparity, prolonged labor, hydramnion, etc.; for one is impressed forcibly in an extensive perusal of the literature, by the large number (about 50 per cent) of cases in which none of these factors are present. In fact, according to Thorn, Vogel and others, the great majority of obstetrical instances occur in primiparæ. In these patients, the usual explanation is the following (Murphy, Dudley, Ashton, etc.): It is easy to conceive how muscular contraction is interfered with particularly at the placental site and especially while the placenta is still attached. There occurs first diffuse uterine inertia; then the relatively paralyzed placental area becomes indented by funic traction or Credé expression, by the weight of the placenta or the pressure of an overfilled colon (Scheffen) or even by a cough or a sneeze on the part of the patient. The uterine muscle exclusive of the placental spot regaining more or less of its tonicity, seizes the inactive placental depression as it would grasp a foreign body, and "in attempting to expel it turns itself inside out" (Ashton). The fact that inversion is more frequent than in multiparæ has an etiological significance per se, considering that most births are not first ones. Holmes thinks that a neurosis or a congenital failure of proper innervation may constitute the explanation.

The attachment of the placenta at the fundus is held by Holmes and others to be an important etiological factor. As an illustration that this location is not essential, Thorn reports two patients and Holmes four in which inversion occurred in connection with placenta prævia. However, the fact that about 80 per cent of placenta prævias occur in multiparæ (inversion is more common in primiparæ) and that about 88 per cent of all prævia cases are delivered prematurely (about 98 per cent of obstetrical inversions occur at full term),—these statistics demonstrate that placenta prævia plays a very small if any part in producing uterine inversion.

The recurrence of obstetrical inversion in subsequent pregnancies is uncommon. In 521 cases Thorn found only 8 such instances recorded, while very many writers report cases of uterine inversion in which later labors and puerperia were entirely normal. The recurrence of inversion immediately or very soon after reduction is unusual, Thorn reporting only 14 such instances in his large series.

As to age, by far the greater proportion of all acute cases occur between 20 and 30. The following table from Beckman (1894) speaks for itself. More recent statistics gathered by the writer and others show similar percentages.

Under 20 years	4 patients
From 20–25 years	38 patients
From 25–30 years	18 patients
From 30–35 years	9 patients
From 35–40 years	7 patients
Over 40 years	1 patient
Total	77 patients

Hence 73 per cent occur between the ages of 20 and 30. This finding, however, has no purely etiological significance when compared with another fact, namely, that 75 per cent of all births occur during this ten-year period. Chronic obstetrical inversions found later usually date back to the second decade for their origin. Chronic ones due to tumor arise more commonly after 30, the time when fibroids are more frequently found.

Practically all instances not obstetrical in origin are caused by fibroid tumors. As a rare exception to this rule, Thorn reports four cases produced by sarcoma and two by car-

cinoma. The fibroids usually are intrauterine or submucous, rarely intramural, and they bring about inversion very gradually. The pathogenesis in these cases is similar in principle to that in obstetrical inversion. In either case a weak spot is produced in the uterine wall; in the latter by the placenta, in the former by the tumor, due to infiltrative growth or pressure atrophy and to traction. The tumor by its presence in the uterine cavity stimulates the contraction of the normal uterine musculature and thus the inversion is produced.

Idiopathic inversions are those which have absolutely no ascertainable cause; that is, they do not occur after an abortion nor following a labor at full term; they do not present any tumor nor any other pathological lesion except the inversion. Olshausen has reported such an instance which occurred in a virgin 18 years old. These cases are very rare, only 13 having been reported (Thorn), as far as the writer knows.

Pathology. As to duration, inversion of the uterus is either *acute* or *chronic.* Most writers consider as acute all cases which last one month or less, while those which pass beyond this limit are classed as chronic. These latter frequently exist for many months, sometimes many years. J. H. Tate, for instance, used his method of reposition for the first time on a case of 42 years' standing. Practically all of the acute cases occur during or directly after the third stage of labor. Of the chronic inversions, one half or more are obstetrical in origin while the remainder are produced by uterine tumors.

In regard to the degree of inversion, these lesions are classified as *complete* and *incomplete.* The incomplete ones are those in which the fundus passes no farther than to the cervix. If any part of the corpus passes through the cervical ring, this stage is called complete by most writers, though Ashton, Murphy and others reserve this term for those rare cases in which the cervix also is turned inside out. A few extreme inversions have been reported (Boyd and others) in which the vagina also was more or less inverted. Practically all obstetrical instances are inversions of the entire corpus, not including the cervix. Judging from reports in the literature, it is a very rare finding indeed to discover an obstetrical inversion at the incomplete stage. The writer knows of but one such instance, which was reported by Summers of St. Louis. In inversions caused by tumor, Thorn found 25 per cent partial and 75 per cent total.

The most important pathological point is the *cervix*, the control of which is the key to the treatment. In all chronic cases, it is firmly contracted. In acute cases, it becomes contracted early, usually within a few hours and sometimes within a few minutes, thus preventing what otherwise would be an easy reposition. Practically all therapeutic measures are aimed chiefly at overcoming cervical resistance. Rigidity of the corpus, however, in some chronic inversions is very important, necessitating incision through the body of the uterus as well as through the cervix in order to accomplish reduction.

Viewing the pathological anatomy vaginally in a typical case, we find that the shape of the inverted corpus is that of a pear with the large end downward. It is large in acute cases; in chronic cases, smaller, a high degree of involution sometimes taking place in inverted uteri (Hoover and others). If the circulation is obstructed, the uterus is large and œdematous; if the circulation is cut off entirely, as has happened in a very few instances, gangrene results (Thorn).

Whether the uterus is wholly within the vagina, partly outside, or wholly outside the vulva depends on the degree of the inversion, the amount of associated prolapse and the length of the uterus. The placenta is attached more or less completely in about half of the obstetrical inversions. Also, in these recent cases, one usually can demonstrate the openings of the Fallopian tubes while later this is difficult or impossible.

Viewing this lesion from the peritoneal side, we find at the uterine site a depression, more or less elongated, depending upon the degree of the inversion. Into this cup are pulled the inner portions of the broad ligaments, the proximal ends of the tubes and, in extreme cases, the entire tubes together with the ovaries. The omentum or the

intestines may fall down into this opening. One case of acute ileus has been reported due to this rare accident (Benson). A portion of the bladder may also be drawn in (Hinchay); and in nearly all cases, and especially in the chronic ones, there is more or less traction on this organ, producing dysuria, etc. In 83 inversions caused by tumor, Thorn found 7 instances of bladder diverticulum; and in these, vesico-vaginal fistula occurred after operation. Adhesions between the infolded peritoneal surfaces are rare. Thorn found only 5 such instances in a large series of chronic cases.

Symptoms. There may be very few subjective symptoms or possibly none at all, even in acute cases; but this is very rare. Barrows describes a very remarkable case of his own in which inversion occurred immediately after the delivery of the baby. He detached the placenta at once and quickly replaced the uterus and the patient never suspected that anything unusual had happened. Bell and Reeve have reported similar cases. Practically all acute inversions, however, show marked symptoms; and the most important of these come under two heads, *hæmorrhage* and *shock*. Pain also is a prominent manifestation. In chronic cases, if one add to the symptoms of uterine prolapse (pain in back, bearing down sensation, bladder and rectal irritation, etc.) those of hæmorrhage and its consequent anæmia, etc., the clinical picture is sufficiently complete for chronic uterine inversion.

The physical findings in a typical acute complete case are as follows: Vaginally, a large, red, rather soft, bleeding, pear-shaped tumor with minute tubal openings, one on either side of the large lower end. Following this tumor upward, one finds no cervical os but instead a shallow fornix all the way around the neck of the tumor and above this the cervical ring, usually more or less contracted. Abdominally, one fails to find the corpus uteri, and at the point which corresponds to the normal cervico-corporeal junction, is found a cup-like depression. This latter may be difficult to detect, except in thin-walled abdomens. In chronic inversions, the vaginal tumor is smaller, less red, not so soft, and it does not bleed so easily; also, the tubal openings can seldom be demonstrated.

Diagnosis. From the subjective symptoms alone, one can never more than suspect the existence of inversion of the uterus. The diagnosis is made exclusively from the physical signs. These already have been described in our discussion of pathology and symptoms and need not be repeated here. In thick-walled women, one will be aided greatly in determining the absence of the corpus from its normal location by using a sound in the bladder and one or two fingers in the rectum. In acute cases, the diagnosis is easy from the vaginal findings alone. However, in one instance at least, it has been mistaken by a physician for a "bleeding tumor." When the symptoms are not acute, inversion frequently is entirely overlooked for many days or several weeks or months and in rarer instances for many years. In 191 obstetrical inversions analyzed by Thorn, 19 were diagnosed immediately post-partum; 44, directly after the delivery of the placenta; and 141, within 12 hours. In 158 cases diagnosed later, 67 were discovered under six weeks; 52, within six months; and 40, after one year. Peterson describes a case which was not diagnosed for 12 years and Reeb, one which was overlooked for 25 years. As far as the writer can judge from the data given in the various reports, in by far the greater proportion of the cases in which inversion is overlooked the error is due, not to misinterpretation of diagnostic signs but to neglect in making any examination at all.

The differential diagnosis in gynecological cases sometimes is very puzzling, especially when a fibroid is present simulating the corpus rather closely in size, shape and position or when the tumor is very large so that it obscures the whole field (Hinchey). Gynecological inversion without a tumor is very rare. Hence, in actual practice one usually has to differentiate only between fibroid with inversion and fibroid without inversion. The key to the situation here is the length of the uterine canal, a *fibroid* always producing *elongation* while *inversion* always *shortens* it. Fig. 3 represents a typical inversion produced by a submucous

fibroid located near the fundus. Note the shortened uterine cavity on all sides of the presenting mass. At no point will the probe pass the normal distance. Compare Fig. 4, a diagram from a recent case of the writer's, where the uterine space is much elongated; the sound passes freely on all sides except where the base of the tumor prevents. Similarly, if the tumor were attached to the fundus instead of laterally, the probe would pass high up on all sides of the fibroid. If, combined with the tumor shown in Fig. 4, there were a moderate inversion at its base, the length of the uterine canal would be about normal or a little less. Therefore we may say, for all practical purposes in gynecological diagnosis, that a tumor-like mass protruding at the external os plus marked elongation of the uterine canal equals fibroid without inversion. This same mass plus a normal or slightly shortened intrauterine space equals fibroid plus moderate inversion. This mass plus marked shortening of the intrauterine cavity equals fibroid plus more marked inversion. Marked protrusion through the external os with a very much shortened uterine canal probably would mean inversion without a tumor. The cup-like depression in the peritoneal side of the uterus produced by inversion is an exceedingly important aid in diagnosis whenever it can be palpated. When inversion with a fibroid is well advanced there may be an indentation between the tumor and the uterus, as in the writer's case (Fig. 1).

Dudley illustrates by diagram a puzzling condition where a subserous fibroid projects into the abdominal cavity simulating closely a corpus uteri, while the body of the uterus is entirely inverted. He does not say whether such a case has ever occurred. The diagnosis of a beginning inversion at the base of a submucous benign tumor is very important; otherwise, in removing the tumor one may cut too deeply and remove also the bottom of the cup, thus making a hole through the uterus (Browne and others).

Prognosis. Like most emergencies, the earlier acute uterine inversion is recognized and treated, the better is the outlook. This statement applies in less degree to chronic inversion. If left to themselves, the majority of acute cases die of shock or hæmorrhage, or later from infection. Chronic cases may last for years without marked symptoms. Beckman gives the mortality in acute cases as 14 per cent; McGlinn, as 70 per cent; Kehrer, as 25 per cent; and Crosse (1847), as 75 per cent. In 399 acute inversions cited by Thorn, 64 (16 per cent) died: 33 from hæmorrhage, 14 from shock, 15 from sepsis, and 2 from lung embolism. In 83 chronic cases caused by tumors (including four *malignant* ones), collected by the same writer, the mortality was 8.5 per cent, one of these deaths being caused by hæmorrhage and the rest by cachexia and infection. Croisie has collated 400 cases, including both acute and chronic, in which the mortality was 35 per cent. Of 109 fatalities in acute cases, 72 died within a few hours, the majority within half an hour; 8 died in from one to seven days; and 6, in from one to four weeks. In 104 chronic inversions, there were only 7 deaths. Murphy and Lynch say, "Statistics show that if the inversion is not reduced the danger after the first month is slight, but increases again with the resumption of menstruation, which is often hæmorrhagic."

Treatment. Considering the comparatively small number of uterine inversions that have occurred in the history of medicine, the variety of the methods of treatment is exceedingly great. A large proportion of those who have treated this lesion either have originated new procedures or have enlarged upon older ones. The following outline gives a synopsis of the various methods, new and old.

A. Non-Operative

I. *Spontaneous reposition.*

II. *Manual reposition.*

1. One hand on the abdomen, the other hand as follows:
   - *a.* Indentation begun at *fundus* (Emmet, etc.).
     - (1) At center.
     - (2) At one cornu.
   - *b.* Indentation begun near *cervix* (Hirst, Fraser, Gurney).
2. Two fingers on cervix through rectum, both thumbs on fundus (Courty).

3. Two fingers of one hand on cervix through rectum; one finger of other hand in bladder as follows:
   a. Through urethra (Tate-Dandridge).
   b. Through vesico-vaginal incision (Dudley).

III. *Mechanical appliances.*
1. Tamponade of vagina with gauze, etc.
2. Bags in vagina distended with water, air or mercury.
3. Repositors (Aveling, Lawson Tait, White, Byrne, Wing, etc.).
   a. Pressure exerted by arms or body of operator.
   b. Pressure effected by elastic bands extending from repositor to waist belt on patient.

B. Operative

I. *Operations upon the cervix.*
1. Incisions.
   a. Extraperitoneal (vaginal).
      (1) Incomplete (Aran, Hirst, Barnes, Sims).
      (2) Complete.
         (*a*) Anterior.
         (*b*) Posterior (Hirst).
   b. Intraperitoneal.
      (1) Vaginal.
         (*a*) Anterior.
         (*b*) Posterior (Hirst).
      (2) Abdominal.
         (*a*) Anterior } (Everke).
         (*b*) Posterior }
2. Dilatation.
   a. Vaginal, through incision in posterior wall of uterus (Browne).
   b. Abdominal, through laparotomy incision (Thomas).

II. *Operations upon the corpus.*
1. Vaginal. Posterior colpotomy; longitudinal incision in posterior wall of corpus; control cervix with two fingers in posterior cul-de-sac — Küstner's operation.

III. *Operations upon both cervix and corpus.* Incision of the entire cervix and more or less of the corpus.
1. Vaginal.
   a. Anterior.
      (1) Extraperitoneal (Kehrer).
      (2) Intraperitoneal (Spinelli, Thorn, Oui).
   b. Posterior — Intraperitoneal (Piccoli, Josephson, Morisani, Duret, Pruntsi, Borelius, Westermark, Sava).
   c. *a* and *b* (Jones).
2. Abdominal.
   a. Anterior.
   b. Posterior (Vignard, Gross, Haultain).

IV. *Manual reposition with one hand through abdominal incision* (Boyd).

V. *Hysterectomy.*
1. Vaginal } *a*. Partial.
2. Abdominal } *b*. Complete.

C. Treatment of Placenta

I. *Removal before reposition.*

II. *Removal after reposition.*

The simplest way by which uterine inversion may be corrected is through spontaneous reposition. Thorn has collected from the literature 13 such instances in acute cases. Boxall has reported a case which occurred as late as three weeks after delivery. Though a fortunate occurrence, spontaneous reduction is so rare that it cannot be relied upon except in some incomplete inversions and for the last stage of reposition in complete cases. When all of the corpus has been pressed up well above the cervical ring, the rest of the reduction is nearly always spontaneous. Johnstone says, "When the fundus has been reduced within the external os . . . the uterus will reinvert itself like an india-rubber cup, turned not quite half inside out." Sometimes this final stage is completed with much force. Parker describes cases of his own in which it took place with an audible thud, and McGlinn, a case in which the "uterus sprang back like an indented rubber ball." Jaeger relates an instance from his own experience in which the final rebound of the uterus threw to the floor some instruments which were lying on the patient's abdomen. Thorn found 8 cases in his series in which reposition was reported as occurring with a jerk or a snap.

In contrast with these experiences, Boyd describes an unusual case of his own in which he had great difficulty in completing the reposition after the fundus had been pushed up above the internal os.

Simple manual reposition is such an ancient procedure and is so widely employed throughout the entire world that I am unable to find anyone who claims to be the originator of this method. The indentation usually is started at the fundus, either near the center or at one of the horns. The starting of the pressure near the cervical ring (Hirst, Fraser, Gurney) instead of at the fundus is a procedure not so widely known, though it is a very valuable detail, because in some cases it will succeed when pressure on the fundus has failed.

Manual reposition should be attempted as early as possible, before contraction of the cervix has become well marked, in order to avoid this great obstacle to all methods of reposition. In recent obstetrical inversions, if there is much difficulty on account of cervical resistance, Dudley suggests that the pressure be exerted during the intervals of relaxation between the uterine contractions. As to a waiting policy, Hoover, of England, stands practically alone in advocating that "mere displacement should be ignored until shock, which is so frequently present, has been satisfactorily treated." In 79 cases of immediate replacement in the presence of shock, he found the mortality to be 30 per cent, while in 47 cases with marked shock which were allowed to become chronic the mortality was less than 5 per cent. He advocates an intermediate course. First he treats the shock for a few hours and then under anæsthesia reduces the inversion. Practically all other writers, on the other hand, are very insistent on *immediate* replacement in all acute cases.

About 1875, Courty, realizing the difficulty in controlling the cervix, introduced the procedure of placing two fingers of one hand in the rectum and both thumbs upon the fundus. This was a helpful idea but fell far short of solving the problem for a majority of cases. In 1878, J. H. Tate, of Cincinnati, tried Courty's method on a patient and failed. At the suggestion of Dandridge, who was a spectator at the operation, he inserted into the bladder through the urethra the index finger of the hand in the vagina. Reduction was thus accomplished rather easily in about half an hour, although the inversion had existed for about 42 years. Dudley has suggested that if this method be used, the finger in the bladder be inserted through a vesico-vaginal incision in order to avoid injuring the urethral sphincter.

As to vaginal tamponade and colpeurynters, comparatively little is said about them in the literature and they seem to be of but little value. In case one employs vaginal bags, if fluid is used to distend them, he must be sure it is sterile in order to avoid infection in case of leakage or rupture. Gariel used a bag which he distended with air.

Mechanical contrivances to aid in reposition have been invented by a large number of obstetricians and gynecologists. Wing devised a "doughnut" pessary repositor; White, a spiral spring; Lawson Tait, a contrivance of his own; but the best known and the most widely used of all of these probably is Aveling's repositor, described by its inventor in 1886. By 1901 it had been used at least eleven times successfully, and about three failures were recorded against it. All repositors should be employed with great care. To continue their use for five or six weeks uninterruptedly, as advocated by Ashton, involves unwarranted danger from lacerations, hæmorrhage and especially infection. Even as late as 1906, Ashton recommended manual reposition and the use of repositors to the absolute exclusion of any sort of cutting operation. Fortunately, however, as the writer thinks, he stands practically alone in this extreme position.

The following statistics, compiled by Thorn, give an adequate idea as to the relative frequency with which the various non-operative methods are used.

Manual reposition	166 times
Colpeurynter	16 times
Aveling's repositor	8 times
Tamponade and colpeurynter	7 times
Tamponade	5 times
Gariel-Galbin instrument	3 times
Total	205

In at least 7 of these cases treated by non-operative reposition, the uterus was badly injured.

In order to control hæmorrhage, Thorn recommends that an elastic rubber tubing be drawn tightly around the base of the inverted corpus. The inefficiency of this suggestion lies in the fact that sterile rubber tubing is seldom at hand outside a hospital; also, the strangulation thus produced may itself cause collapse (Spiegelberg).

Cutting operations of a minor nature were employed vaginally on the uterus more than fifty years ago. In 1858, Aran; in 1866, Sims; and still later, Barnes used superficial uterine incisions to assist in reposition. T. G. Thomas, however, in 1872, was the first to report the use of an extensive cutting operation for this condition. In his first case, through a small incision in the anterior abdominal wall, he distended the cervix with a metal dilator and accomplished an easy reposition, the patient making a good recovery. Several others tried Thomas' method, some as he had done it, others with modifications. For example, Everke (1899) made anterior and posterior cervical incisions by the abdominal route to facilitate dilatation and reduction, while Haultain (1908), through a similar opening, made a cervical incision posteriorly and extended it into the corpus as far as was necessary to accomplish reduction. Vignard, Gross, and Nuñez also have treated uterine inversion successfully by this method. Boyd (1912) used a laparotomy to aid in manual reposition merely by placing one hand on the cervix through an anterior abdominal incision.

Several fatalities followed Thomas' method in the hands of other operators. For this reason and because a cœliotomy seemed an unnecessarily serious operation, others sought to attack the cervical ring from below. In 1883, Browne made known his simple and ingenious procedure, which he had carried out successfully on a case of his own. He dilated the cervix through an incision in the posterior wall of the corpus (Fig. 5), sutured the incision and then replaced the uterus by simple manual reduction. Ten years later (1893), Küstner published a description of his operation. He made a uterine incision precisely similar to that of Browne's; in addition, however, he did a posterior colpotomy and through this opening controlled the cervix during reposition and sewed up the uterine incision after reduction. An opening for drainage was left in the posterior cul-de-sac.

Browne's operation in America and Küstner's in Germany marked the beginning of the modern and most approved method in difficult cases, namely, posterior colpotomy and incision of both the cervix and the corpus (Fig. 7). Piccoli, in 1893, was the first to suggest this more extensive procedure, while Josephson, in 1894, was the first to try it on an actual case. He failed, however, and performed a hysterectomy. Morisani, in 1896, carried out the operation for the first time successfully. The following year it was done by Sava, and Westermark; the next year (1898), by Borelius, Pruntsi, and Duret. Most if not all of these men performed the operation without knowing that it had been done by the others. By a rare coincidence, Borelius and Pruntsi did it on the same day (May 26, 1898). Therefore, to christen this procedure by its full name according to its fathers and godfathers, we should call it the Küstner-Piccoli-Josephson-Morisani - Sava - Westermark - Borelius - Pruntsi - Duret operation.

This same method was developed a little later by American operators in the following manner: I have already referred to the superficial uterine incisions made through the cervix by Aran, Sims and others. In 1900, Hirst carried this idea forward to a complete extraperitoneal incision of the cervix (Fig. 6). Very soon afterwards, in difficult cases, Hirst and others extended this incision more or less into the body of the uterus (Fig. 7), including also a posterior colpotomy.

During almost exactly the same years that Josephson, Duret, etc., were perfecting their method, Kehrer, Spinelli, Thorn, Oui, and others were developing a precisely similar operation anteriorly. Kehrer in 1898 reported his method of using an extraperitoneal incision extending through the entire anterior wall of the uterus. As he replaced the uterus, he inserted the uterine sutures before any given portion of the uterus had been pushed in

too far to be reached with the needle. Spinelli used this same method, with the addition of an anterior colpotomy; through this opening, reposition was facilitated and the incision in the uterus could be sutured after reduction of the inversion. In either the anterior or the posterior colpohysterotomy, if the incision is extended throughout the entire length of the uterus, the whole procedure of incising the uterus, reducing the inversion, and suturing the uterine incision usually is done wholly within the vagina; afterwards, the uterus is put back into the pelvic cavity through the colpotomy incision.

Hysterectomy may be done on account of one or more of the following indications:

1. Marked infection. This is the most common valid reason.

2. Gangrene. (Rare; three cases are reported, by Hutson, Steele, and Mériel.) Here, of course, hysterectomy is imperative.

3. Tumors: *a*. Malignant (Thorn has found 6 such cases, 4 sarcomata and 2 carcinomata); *b*. Benign tumors involving a large part of the uterus.

4. In chronic inversions past the menopause, for the same reasons that a hysterectomy might be done at this age for a marked prolapse without inversion.

5. Instances where reposition is impossible. This indication ought to be exceedingly rare.

6. Weiss (1912) considers hysterectomy "the method of choice in chronic inversions of puerperal origin." This extreme position seems to the writer to be entirely unjustifiable.

Of course, the vaginal route should be chosen in cases of infection or gangrene. In the cases of inversion with tumors, the inversion usually is of secondary importance, so that the treatment is determined mostly by the nature, size, position, etc., of the tumor, a discussion of which is not pertinent here. There have been several cases recorded in which hysterectomy was done for the sole reason that reduction could not be accomplished (Josephson, Hoover, etc.). For these instances the writer suggests a combination of procedures which, as far as he knows, has never been tried, namely, both anterior and posterior colpohysterotomy. Incise the cervix on both sides and extend one or both incisions as far as necessary toward the fundus. Then, with the fingers of both hands passed through the colpotomy incisions onto the doubly divided cervix and with the thumbs of both hands on the portion of the fundus which remains undivided, it seems that the most ancient and intractable case ought to be overcome so that there would be no excuse for removing a uterus on account of inversion alone.

In regard to the safety of the various operative methods in acute inversions, the following statistics collected by Thorn are very instructive:

Kind of Operation	No. of Cases	Per cent Mortality
Laparotomy	24	21
Vaginal Hysterectomy		
Total	28	7
Partial	26	4
Colpohysterotomy:		
Posterior	42	0
Anterior	8	0
Total No. Cases	128	
Av. Mortality		6

Among the laparotomies, there were five failures of reposition. These together with the high mortality speak strongly against this method. Considering especially the safety of colpohysterotomy and also its efficiency and the relative ease with which it may be done, one is not justified in making prolonged efforts at manual reposition or in trying repositors for more than a few hours. In all acute cases, simple manual reposition should be tested first; and usually it will succeed. In chronic cases it may be tried, and sometimes success will ensue, especially if some modification is used (Courty, Tate-Dandridge, etc.).

In using the method of colpohysterotomy, one should make only the cervical incision (Fig. 6) or the incision in the corpus (Fig. 5) at first, and then attempt reduction. In case the lesser incision fails, prolong it as far as necessary, making the complete incision (Fig. 7) or even both anterior and posterior incisions if necessary.

In a few instances, on account of a small vagina or a large uterus or a large tumor, etc., it is best or even imperative that one select the abdominal route.

In incomplete inversions operative treatment is seldom required for the inversion itself. One does have to operate, however, on

the concomitant tumor, which usually is the causative agent in these instances.

The following statistics from Thorn show the relative frequency with which various operative procedures are employed in cases of inversion caused by myomata.

Spontaneous separation of myoma	3 cases
Enucleation of myoma	35 cases
Amputation of uterus	19 cases
Total vaginal hysterectomy	14 cases
Combination of methods	3 cases
Unoperated	3 cases
Total No. cases	77

In the 35 cases in this table in which enucleation of the tumor was accomplished, the treatment of the inversion was as follows:

Spontaneous reposition	14 cases
Manual reposition	10 cases
Colpeurynter	4 cases
Tamponade	3 cases
Küstner's operation	1 case
Reduction by laparotomy	1 case
Unreduced (one complete, one partial)	2 cases
Total No. cases	35

Of the 19 cases in which the corpus was amputated, in three instances reposition of the cervical stump was spontaneous. Thus we see the importance of spontaneous reduction in this class of cases, especially in instances of simple enucleation of the tumor, where its frequency is 40 per cent.

The treatment of inversion by surgical methods occupies such a large place in the literature that one is apt to acquire an exaggerated idea as to the number of cases in which it is indicated. Probably at least 75 per cent of all inversions are treated best by manual reposition and other non-cutting procedures; but in the relatively small number in which operation is necessary, the need for it usually is very urgent.

TREATMENT OF THE PLACENTA

There is considerable disagreement in regard to this subject. Dudley, Ashton, Thorn, and many others advise removal of the placenta before reposition, while Murphy and Lynch, Barrows and others replace the uterus without previous separation of the placenta, chiefly, they maintain, in order to avoid hæmorrhage. Still others assume an intermediate position, namely, removal if it is partly detached or reposition with the uterus if it is still entirely adherent. Byford, many years ago (1873), advised this course. Here, again, the main key to the situation is the contraction of the cervix.

Reasons for replacing placenta:

1. To avoid hæmorrhage, especially in extreme uterine relaxation —a very important point. Boyd, however, describes a case in which the hæmorrhage "became alarming and continued until the placenta was detached."

2. To avoid loss of time. If the placenta is adherent, enough time may pass so that a relaxed cervix may contract and thus make reduction difficult or impossible. This is a valid reason.

Reasons for separating placenta before reposition:

1. If adherent, it may be much more difficult to remove after reposition — a demonstrated fact (Fraser).

2. The placenta, by its bulk and unwieldiness, may prevent reposition if the cervix is contracted; this has occurred several times (McGlinn).

3. By its weight the placenta may cause reinversion (McGlinn), especially if the cervix remain relaxed.

4. Since the placenta is the portion of the descending mass which comes down farthest, often protruding outside the vulva, it is more likely to become contaminated. Hence, if possible, avoid placing it back inside the uterus. This is a very important consideration.

The majority of those who have actually treated cases of obstetrical inversion have separated the placenta before attempting reposition and they hold that usually this is the best course to pursue. Thorn says that "reposition of the placenta would be indicated only when the placenta is completely adherent when also there is no hæmorrhage, and when further it is impossible to apply constriction at the isthmus to control hæmorrhage — a combination of circumstances which would occur very rarely." Thorn's position is somewhat extreme. On the whole, replacement of the placenta seems to be allowable if

it is not contaminated with infectious material and if the cervix is not contracted.

SUMMARY

1. *Etiology.* In obstetrical inversion, the primary cause is uterine relaxation. The chief secondary factors are pressure on the fundus and traction on the cord. In inversion not obstetrical in origin, uterine fibroid is almost the exclusive cause.

2. *Pathology.* Most cases are both acute and complete; in the complete ones, the most important point is the degree of contraction of the cervix. In inversion of gynecological origin the causative tumor is of pre-eminent importance.

3. *Symptoms.* In acute cases, the cardinal symptoms are hæmorrhage, shock and pain. Later, the manifestations of a complicating infection may appear. In chronic inversion, the symptoms are those of marked uterine prolapse plus those of menorrhagia and metrorrhagia.

4. *Diagnosis.* This is made from the objective findings exclusively. In obstetrical inversions, it is almost always very easy. Vaginally, a large, soft, pear-shaped, bleeding tumor is found, with the placenta attached in about half the cases. Abdominally, no corpus is found, and in its place there is a cup-like depression. In gynecological cases, the diagnosis of inversion due to a fibroid frequently is very difficult. The chief points are first, the shortening of the uterine canal produced by inversion as compared with the lengthening caused by a fibroid; and secondly, the indentation produced by the inversion on the peritoneal surface.

5. *Prognosis.* The mortality in acute cases in recent years has been about 35 per cent; in chronic ones, about 6 per cent.

6. *Treatment.* In all acute and in most chronic cases, manual reposition should be tried. In most of the former, if undertaken early, and in many of the latter, this procedure is successful. If it fails, repositors, etc., may be used, but only for a short time. If these are unsuccessful, one should resort at once to some operative method, the one of choice being colpohysterotomy. This operation stands pre-eminent in the treatment of difficult cases of uterine inversion, on account of the facility of its performance and its success in accomplishing the reduction of the inversion, and also because of the practically complete absence of any mortality. The uterine incision should be made at first through the cervix only, and later be extended as far into the corpus as necessary to accomplish reposition. In inversion due to tumor, the treatment is mostly that of the causative fibroid. After this is removed, if the uterus still remains, in about one third of the cases spontaneous replacement occurs, while in the other instances reduction is accomplished usually without difficulty by non-operative methods.

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[1] Thorn's largest and most important publication on this subject.

THE PATHOLOGY OF UTERINE CASTS PASSED DURING MENSTRUATION

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IN January, 1912, I showed before the Gynecological Section of the Royal Society of Medicine [1] two somewhat unusual uterine casts passed during menstrual periods by a married woman aged 32. These specimens very much resembled abortions, both in their macroscopical and microscopical appearances; but as I had removed the patient's tubes some two years previously there was strong presumptive evidence against pregnancy.

I brought forward these specimens for the purpose of provoking a discussion on the pathology of menstrual casts, since there are many who still adhere to what I regard as an untenable view: namely, that all endometrial menstrual casts are the result of conception. The discussion [2] tended to emphasize this point of view. I therefore showed a further series of specimens before the Society last July.[3] The general opinion then expressed in the discussion coincided with mine: namely, that while there is a decidua-like reaction, it cannot be mistaken for the true decidual reaction of pregnancy.

I have thought it worth while, therefore, to publish an account of this further series of specimens which I have obtained in the last six months. I hope to prove, once and for all, that the idea that menstrual endometrial casts are all the products of conception is an entirely erroneous one, although of course abortions do occur and may sometimes be confused with menstrual casts by those who are unaware of the histological differences.

In order to make the communication more or less complete, I propose to discuss all forms of menstrual casts. These may be:

1. True blood casts of the uterus;
2. Endometrial casts:
   (*a*) Thick casts,
   (*b*) Thin casts.

I do not believe any other form of *menstrual* cast exists.

1. *True blood casts of the uterus.* One or more of these may be passed during a menstrual period. The specimens shown in Fig. 1 were all expelled at the same menstrual period, during which there was considerable bleeding. The patient was a married woman about 45 years of age, and she had had menorrhagia for three months. The pathology of this condition is not difficult to understand.

As I have previously stated,[4] and hope shortly to prove more fully, menstrual blood does not clot normally, because the fibrinogen and fibrin ferment are extracted by the endometrium. When, however, the endometrium is unhealthy and fails to extract the ferment, or when the flow is so great that the blood passes through the endometrium too quickly for the extraction of the ferment to be effected, then in either case clotting of the menstrual blood may take place in the uterine cavity. The expulsion of the clots leads to dysmenorrhœa, as I have pointed out elsewhere.[5]

These blood casts of the uterus are therefore merely retained clots which have been moulded into the shape of the uterine cavity. Histologically they are seen to consist of blood clot only (Fig. 2).

2. *Endometrial casts* may be thick or thin, and they are usually passed in two separate portions.

(*a*) *Thick casts.* Such specimens (Figs. 3, 4, and 5) are not common, and they are certainly the most difficult to distinguish from abortions. But I think that the histological appearances of these casts do not resemble those of the ordinary true decidual cast of pregnancy so much as is usually thought. The specimens were passed by a woman whose tubes I had previously removed. She expels them almost every month; and, as will be seen from the illustrations, they are some-

[1] Proc. Roy. Soc. M., Feb., 1912, p. 153.
[2] Proc. Roy. Soc. M., Feb., 1912, p. 156.
[3] Proc. Roy. Soc. M., July, 1912, p. 371.
[4] Proc. Roy. Soc. M., April, 1911; J. Obst. & Gynec. Brit. Emp. April, 1912.
[5] The Principles of Gynecology, 1910.

Fig. 1 (above). Menstrual blood-casts of the uterus.
Fig. 2. Section of Menstrual blood cast.

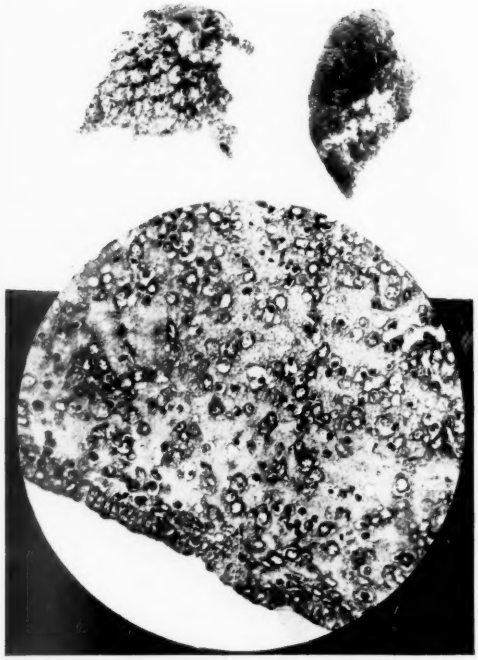

Fig. 3 (above). Thick menstrual endometrial cast. From same patient as the one shown in Figs. 4 and 5.
Fig. 6. Section of cast shown in Fig. 3.

what variable in macroscopical appearance. The membranes themselves are thick. If not rolled up they are smooth on the surface lining the uterine cavity and shaggy on the surface that has been detached from the uterine wall. Their thickness depends entirely on the fact that practically the whole thickness of the endometrium has been detached. The third specimen (Fig. 5) is very small and consists of rolled-up pieces of tissue. I have recently obtained a fourth cast from this patient, which is similar in macroscopic appearance to that shown in Fig. 4. The microscopical appearance, however, is the same in each case (Figs. 6, 7, 8 and 9).

There is a decidua-like change in the cells of the stroma and those lining the glands, but this decidua-like change differs from the decidual change of pregnancy chiefly in the size and shape of the cells. Further, there is marked effusion of blood serum among the cells which gives rise to a ground-glass appearance in the stroma. This is not seen in the decidua of pregnancy (Fig. 10).

In all these menstrual membranes it is usual to find a certain amount of degeneration, which is proportionate to the length of time they have been retained before being passed and fixed in preservative fluid. Sometimes the degeneration or maceration is so advanced as to make histological investigation and photomicrography difficult.

(*b*) *Thin casts.* These casts are more readily admitted by many to be menstrual rather than conceptional in origin, although there are still those who believe that these membranes also are the result of pregnancy. Four specimens from two patients are illustrated (Figs. 11, 12, 13, and 14).

Both women were married. The one from whom specimens shown in Figs. 11 and 12

Fig. 4 (above). Thick menstrual endometrial cast from same patient as those shown in Figs. 3 and 5.
Fig. 7. Section of cast shown in Fig. 4.

Fig. 5 (above). Small thick menstrual endometrial cast. From same patient as those shown in Figs. 3 and 4.
Fig. 8. Section of cast shown in Fig. 5. Incidentally the folding of the membrane on itself to produce a solid cast is shown.

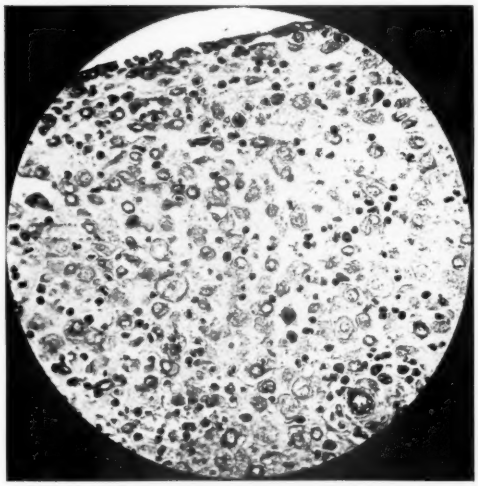

Fig. 9. Section of fourth menstrual cast from the patient from whom casts shown in Figs. 3, 4 and 5 were obtained.

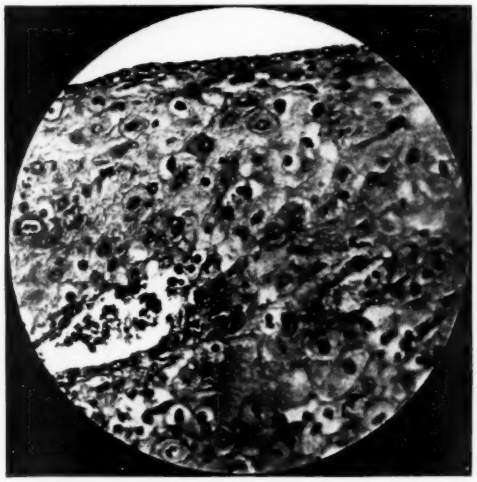

Fig. 10. True decidual cast (abortion). Compare with Figs. 6, 7, 8 and 9.

Fig. 11 (above). Thin menstrual endometrial cast. From same patient as that shown in Fig. 12.
Fig. 15. Section of thin endometrial cast shown in Fig. 11.

Fig. 12 (above). Thin menstrual endometrial cast from same patient as Fig. 11.
Fig. 16. Section of thin endometrial cast shown in Fig. 12.

were obtained commenced to pass them only after her second marriage. The specimen shown in Fig. 12 was obtained after a test separation, if the statement of the patient can be relied upon. The patient from whom specimens 13 and 14 were obtained was the wife of a doctor who has given me the fullest particulars of her case. Knowing the common supposition with regard to pregnancy, he assures me that these membranes are passed subsequently to a test separation just as at other times. Another interesting feature connected with this last case is the fact that the two sisters of the lady in question also pass similar membranes every menstrual period. They are both unmarried. A breakage in the post robbed me of the opportunity of investigating membranes passed by the two sisters.

Sections of these thin endometrial casts show in every instance that there has been a decidua-like change in the stroma cells (Figs. 15, 16, 17 and 18). Of course when the membrane is as thin as some of these are, degeneration takes place very rapidly and the decidua-like reaction is not always easy to photograph; but if careful histological examination of the sections be made, no doubt can be left in the mind of the observer as to the character of the change.

Cuthbert Lockyer's statement that in his experience "the cells in menstrual endometrial casts were small, shrunken and branching; the stroma was formed of a slender adenoid reticulum," [1] cannot in my opinion be accepted as representing the typical microscopical appearance seen in these specimens. That description applies to the normal endometri-

[1] Proc. Roy. Soc. M., Feb., 1912, p. 157.

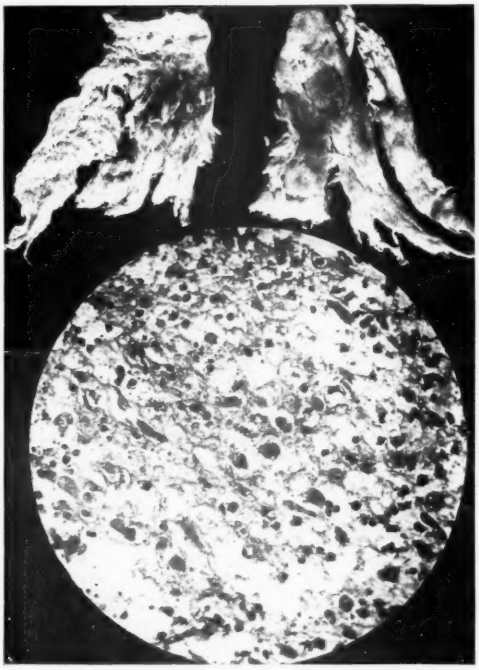

Fig. 13 (above). Moderately thin menstrual endometrial cast. From same patient as that shown in Fig. 14.
Fig. 17. Section of thin endometrial cast shown in Fig. 13.

Fig. 14 (above). Moderately thin menstrual endometrial cast. From same patient as that shown in Fig. 13.
Fig. 18. Section of thin endometrial cast shown in Fig. 14.

um in the 'resting' stage of the menstrual cycle.

From the above description it will be seen that there are two forms of menstrual casts from the uterus: the 'blood cast' and the 'endometrial cast.' With regard to the differences in the thickness of the latter, I believe this to depend solely on the depth of the endometrial denudation. The menstrual decidua-like reaction which, as already pointed out, can be seen in the sections, prevents the blood from breaking through easily; consequently the menstrual hæmorrhage strips up the superficial portion of the endometrium instead of passing through it. This may lead to a considerable portion of the endometrium being stripped off (thick membrane) or to denudation of the superficial layers only (thin membrane). Either type of membrane may become rolled up and form a so-called 'solid' endometrial cast (Figs. 5 and 8) when retained long enough in the uterine cavity.

NOTES OF CASES ILLUSTRATING SOME OF THE SURGICAL ASPECTS OF PERSISTENT MECKEL'S DIVERTICULUM

With Remarks and a Record of Twenty-two Cases

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ON reviewing the surgical records of the Royal Victoria Infirmary from 1900 to May, 1912, I found no less than 22 cases of acute abdominal disease resulting from a persistent Meckel's diverticulum. These cases are all of interest because they illustrate the majority of dangers for which this remnant of the omphalomesenteric duct is responsible.

At the pathological meeting of the Northern Division of the British Medical Association in the summer of 1910 I showed a series of Meckel's diverticula removed either by operation or obtained from the post-mortem room, and drew attention to different varieties and to the dangers which each particular type was likely to occasion.

The accompanying table, though incomplete, shows that, speaking generally, a certain type of diverticulum is responsible, when harm arises from it, for a definite and specific lesion; e. g., a Meckel's diverticulum of unusual length (6 or 8 inches) will cause intestinal obstruction, and may be inflamed or strangulated as the result of interference with its blood supply by a loop of implicated small intestine.

Again, a diverticulum adherent to the umbilicus, by acting as a band, may cause strangulation of the small intestine or produce a secondary volvulus.[1]

Or, diverticula of the small cone-shaped variety may become inverted into the bowel and produce intussusception. These have their broad base at their proximal end, and when examined in the recent state the mucous membrane at the base is usually found to be lax. It has been shown that at an early stage this lax mucosa only may be prolapsed into the small intestine from which the diverticula springs, and that, acting like a prolapsed pile, this in its turn may produce hæmorrhage and pain.

Since recording six cases of inverted Meckel's diverticula which caused intussusception[2] two more have occurred in the Royal Victoria Infirmary, Newcastle-upon-Tyne, making 7 per cent of all cases of intussusception admitted from 1900 to June, 1912. One of these, which came under the care of Mr. Turner, is of special interest since it illustrates the fact that frequent attacks of pain may occur before the diverticulum is completely inverted into the bowel and the accompanying intussusception is produced.

The patient, a clerk aged 34, was admitted to the hospital on January 22, 1912, with a history that in August, 1911, he began to have attacks of abdominal pain accompanied by loud rumblings and sometimes diarrhœa, though no blood was ever found in his stools.

In November, 1911, the attacks became more pronounced and he was obliged to take to bed for several weeks. The attacks of pain recurred from time to time, and about a month before admission he vomited, and a week before admission the vomit contained some altered blood, but there was no melæna. For three days before admission he vomited incessantly and complained of great pain coming on in spasms. The bowels acted regularly and there was a tendency to constipation.

On admission he looked very ill and wasted: pulse 128; temp. 98°. The abdomen was distended, but not markedly so, and no intestinal movements could be seen. Rectal examination was negative. An enterostomy was performed by Mr. Turner, but no further exploration of the abdomen was made on account of his general condition. He died two days later from toxæmia.

On post-mortem examination an intussusception of the small intestine was found, the apex of which was formed by a Meckel's diverticulum about 3 inches in length. The distal end of the diverticulum was bulbous and gangrenous (Fig. 2).

[1] For classification of volvuli of intestine see "Introduction to Surgery," by Rutherford Morison, p. 126.

[2] Ann. Surg., Phila., March, 1912.

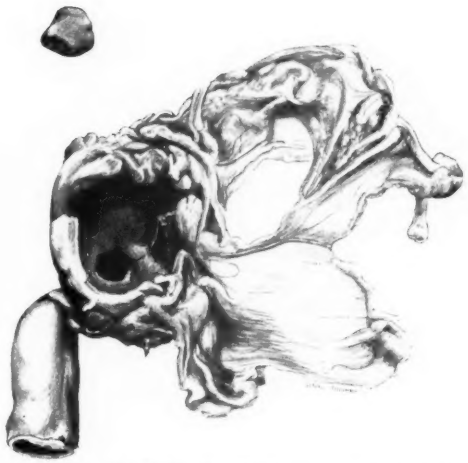

Fig. 1. A Meckel's diverticulum which contained a calculus. The distal end was bulbous and formed an abscess cavity. It was covered over by adherent omentum which prevented rupture of the abscess into the general peritoneal cavity (calculus natural size).

Although the pathological conditions resulting from a Meckel usually conform more or less accurately with one of the above types, there may be complications, a fact which is illustrated by a case admitted into the Royal Victoria Infirmary under the care of Mr. Martin in December, 1909.

The patient had intestinal obstruction, complete gangrene of the terminal portion of the Meckel due to strangulation of its blood supply, and an abscess cavity surrounding the gangrenous perforated diverticulum in which a calculus was found.

D. H., male, aged 27, whose history was as follows: Eight days before admission he was seized with a sudden pain in the abdomen just below the umbilicus whilst taking his midday meal. He was obliged to go to bed, and hot applications were applied to the abdomen, but without relief, as the pain recurred in paroxysms about every twenty minutes. Two days later he vomited dark green, bile-stained material, and the pain and vomiting continued up to the time of admission.

When admitted, his general condition was good; his tongue was moist and red; pulse 86; temp. 98.4°. He complained of paroxysmal abdominal pain. On inspection, the lower abdomen was somewhat distended. No peristaltic movements could be seen. On palpation a distinct mass could be felt below and to the left of the umbilicus, tender on light pressure.

On December 17, 1909, Mr. Martin explored the abdomen by a middle line incision below the umbilicus. An abscess was found just to the left of the umbilicus in contact with the anterior belly wall. Coils of small bowel and a portion of the omentum surrounding it formed the abscess walls. In the center of the abscess lay the distended distal end of a Meckel's diverticulum, which was gangrenous and perforated, allowing the escape of a small calculus into the abscess cavity. Several of the surrounding loops of small intestine were greatly distended and obviously obstructed. The abdomen was packed off, the Meckel's diverticulum was exposed, ligatured at its base, and excised, along with an adherent portion of great omentum, and the stump of the diverticulum was inverted into the intestine by a purse-string suture of catgut.

A gauze drain was placed in the affected area and the abdomen was closed in layers by catgut. The patient made an uninterrupted recovery and left the hospital well and healed on January 11, 1910.

Description of specimen (Fig. 1). The diverticulum was 4 inches in length. The distal end was distinctly bulbous, forming a cavity that would hold a pigeon's egg. The

Fig. 2. A Meckel's diverticulum which has become inverted into the bowel. It formed the apex of an intussusception of the small intestine, which has been reduced.

wall of this portion was surrounded by omentum except at the point of rupture (in the drawing this has been removed), where it was merely formed by the thin gangrenous coat of the diverticulum. The proximal end communicated with the distal portion by a narrow channel ¼ inch in diameter. The distal end of the diverticulum, in the ordinary state, contained a flat calculus ½x½x¼ inches. The surface of this was smooth, non-faceted, of firm texture, and dark brown in color. It weighed 12 grains, and Prof. Bainbridge, who kindly made an analysis, reported it to consist of inspissated fæcal matter containing bile pigment.

The differential diagnosis of the most common lesions produced by Meckel's diverticulum, viz., peritonitis and obstruction, is difficult, because either condition may be produced by other causes, the most common being a diseased vermiform appendix, and the pathology of these lesions, whether occurring in connection with Meckel's diverticulum or appendix, is the same. Both may suffer from attacks of inflammation varying in degree from catarrh to gangrene, and either may cause intestinal obstruction, though in the case of the appendix obstruction is nearly always due to a kink in a loop of small bowel entering into the formation of an appendicular abscess, and is consequently secondary to an inflammatory lesion primary in the appendix; whereas in the case of the Meckel's diverticulum obstruction is often the primary lesion and changes in the Meckel itself secondary (strangulation, inflammation, gangrene).

An example of an appendix causing obstruction was admitted into the Royal Victoria Infirmary under Mr. Clay in April, 1909.

The patient, a boy aged 10, had acute intestinal obstruction. A long appendix had become wrapped round a loop of small intestine, causing strangulation of the bowel. The swelling of the distended loop interfered with the blood supply of the appendix so that the tip of it was quite gangrenous.

But this train of events, as has already been stated, is comparatively rare.

The difficulty attending the differential diagnosis of acute abdominal lesions caused by Meckel's diverticula from those associated with the appendix vermiformis is plainly shown in cases 20 and 21 of this series.

The subject of case 20 was a male aged 55 who was admitted into the Royal Victoria Infirmary on September 7, 1911, under the care of Mr. Richardson. He was seized with pain in the right side of the abdomen, with vomiting 14 days before. The symptoms subsided and he felt better until three days before admission, when the pain returned in the lower part of the abdomen.

On admission he looked ill; temp. 99°, pulse 100. The abdomen was tender and rigid in the right iliac fossa, where there was an indefinite mass. A diagnosis of acute appendicitis was made.

At the operation a small normal appendix, 2 inches long, was found. A small Meckel's diverticulum was also discovered, with its distal end adherent and gangrenous but not perforated. This was removed and the patient went home well on September 18, 1911.

The other case, No. 21, is also of interest. A young man aged 19 was admitted into the Royal Victoria Infirmary on March 1, 1912, under the care of Mr. Martin, with the history that ever since his appendix had been removed six years before he had been subject to attacks of abdominal pain in the region of the appendix. At about 5 o'clock on the previous evening he had been seized with severe pain, which was referred to the umbilicus. He felt very ill and vomited frequently up to the time of admission.

On admission his pulse was 132, thin and thready, and he looked very ill. The abdomen was distended and there was no flank dullness. The liver dullness was present.

Mr. Leech, who saw him, operated and found a Meckel's diverticulum 4 inches in length. The terminal end was bound down in the pelvis, and a band which extended from the bulbous end of the Meckel to the ileum a short distance above its origin was the cause of acute intestinal obstruction. After the obstruction was relieved it was found necessary to resect the Meckel and adjacent loop of small bowel. This was done and a lateral anastomosis made.

Many cases of acute Meckelitis operated upon for appendicitis have been recorded, to a few of which I may briefly refer.

Sherren[1] reports a case of his own, occurring in a man aged 38, who for two and a half years had suffered from attacks of pain in the right iliac region. A diagnosis of appendicitis was made and at the operation a mass was felt containing calculi, which was thought to be gall-bladder but which turned out on exposure to be a Meckel's diverticulum, which in the recent state measured 4½ inches in length, and presented at a point about 1 inch from

[1] Royal Society of Medicine, Nov., 1909.

the proximal end a definite constriction, formed by a fold of mucous membrane. Beyond this point the diverticulum contained many small black calculi composed of cholesterin, calcium oxalate, and a trace of bile pigments. It was removed, and two years later the patient was well and free from attacks of pain.

It was thought that these calculi were formed in the diverticulum as the result of inflammation of its mucous membrane, and the fact that the neck of the diverticulum was too small to admit the passage of the greater number of the calculi confirms this view.

Hollander[1] reported a case of a man operated upon ten hours after the onset of an attack of abdominal pain that was supposed to be due to appendicitis. The operation, however, revealed a gangrenous Meckel's diverticulum full of calculi which were thought to be gall-stones. The diverticulum was removed and recovery followed.

Oliver Smith,[2] in a paper dealing with abdominal crises caused by Meckel's diverticulum, records two cases of his own, in one of which appendicitis was diagnosed and a gangrenous Meckel found at operation.

Todd,[3] writing on the same subject, states that in his experience a Meckel is frequently the cause of abdominal lesions, and that it may give rise to all the urgent symptoms of acute appendicitis. He remarks: "We are all familiar with cases of recurrent abdominal pain, with distention and tenderness, which have been diagnosed as relapsing appendicitis. Our diagnosis has not perhaps been made as certainly as we could wish. In spite of the acuteness of the pain and the urgency of the symptoms, the pulse is often hardly quickened at all and, more disconcerting still, the temperature does not rise. At the operation the appendix is found normal, or almost normal, but to remove it is a safe thing to do, and the hope is expressed that the cause of the disturbance is removed; not infrequently, though, the pains recur as before. This is the class of case in which I think very often the diverticulum is in one of the ways I will presently mention the cause of the symptoms."

Along with cases of his own he records particulars of one of some interest that occurred in the practice of a colleague.

The patient, a boy aged 10, had an acute abdominal attack. The pain was most marked in the appendix region. The appendix, which was not obviously diseased, was removed. On the day following the operation he was worse. The abdomen was again opened and a long Meckel's diverticulum, the vessels of the mesentery of which were thrombosed, was found knotted round a large coil of ileum. In this case no doubt obstruction occurred first and later gangrene of the Meckel, due to the increasing congestion of the loop of small intestine involved.

He also records two similar cases which occurred in his own practice.

There are many cases of inversion of the appendix into the cæcum on record, and, as we know, some of these have been responsible for an intussusception of the cæcum.

Both diverticula and appendices may contain calculi. As stercoliths they are more frequently met with in the latter, but they are capable of giving rise to similar symptoms and of producing the same pathology. The poor blood supply of a Meckel's diverticulum probably renders it more liable to gangrene than the more richly supplied vermiform appendix, and it is quite common to meet with Meckel's diverticula in which the distal end is bulbous, thin-walled, and without the good vascular supply which the remaining portion often possesses.

Sometimes an abdominal lesion due to Meckel's diverticulum is suggested by the discovery of some abnormality at the umbilicus. Treves[4] states, for example, that a congenital hernia is not infrequently present, and other abnormalities of the umbilicus are recorded, from a mere tucking in to definite fistula.

Bidwell[5] operated upon a case of intussusception of the ileum due to an inverted Meckel's diverticulum in a boy aged three on whom he had previously operated for a congenital hernia at the age of one year.

Gray[6] operated upon a case of intussusception of the ileum due to an inverted Meckel's

[1] Quoted by Sherren, Royal Society of Medicine, Nov., 1909.
[2] Ann. Surg., Phila., Nov., 1904.
[3] Australasian Med. Gaz., Dec. 20, 1911.
[4] System of Surgery, vol. ii, Page 727.
[5] Lancet, Sept., 1907.
[6] Ann. Surg., Phila., Dec., 1908.

No. of Case	Lesion caused by Meckel	Sex	Age	Duration of attack	Previous attack	Operation	Result	Type of diverticulum	Umbilical cicatrix
1	Intestinal obstruction	Male	7	6 days	No note	Enterostomy	Death	No note	No note
2	Inversion of Meckel, causing intussusception of small bowel	Male	25	3 days	Previous attacks for several months	Resection of intestine; Meckel	Recovery	4 inches in length	No note
3	Inversion of Meckel, causing intussusception of ileum	Male	5	1 day	No note	Reduction of intestine; removal of Meckel	Recovery	Cone-shaped Meckel broadened at base, 1¼ inch in length	No note
4	Strangulation of small intestine	Male	Adult	2 days	No note	Resection of gangrenous gut, including Meckel's diverticulum; anastomosis	Death	Adherent at its apex to the umbilicus	No note
5	Acute intestinal obstruction of ileum and perforation of Meckel, causing septic peritonitis	Male	4	5 days	No note	None	Death	No note	
6	Acute intestinal obstruction of ileum from adhesions around a Meckel which itself was completely obstructed and gangrenous	Male	6	3 days	No note	Removal of gangrenous Meckel and adhesions relieved	Death	Small narrow Meckel 2 inches in length adherent at its apex	
7	Inversion of Meckel, causing intussusception of small bowel	Male	11	3 days	No note	Resection of intussusception, including Meckel	Death	Small cone-shaped Meckel 1½ inches in length with broad base	Marked intucking of umbilical cicatrix
8	Acute intestinal obstruction of loop of ileum, the Meckel acting as a band	Male	13	4 days	Attacks of pain and vomiting coming on every 6 months for 8 years	Removal of Meckel's diverticulum	No note; Death	Meckel 6 inches in length and tapered to a cord at its distal end, which adhered to umbilicus	No note
9	Meckel looped over small gut, causing obstruction; Meckel itself was completely gangrenous	Male	16	1 wk.	None	Removal of Meckel's diverticulum	Death		No note
10	Meckel became obstructed, gangrenous and perforated, forming an abscess containing calculus; intestinal obstruction	Male	27	8 days	None	Removal of Meckel and calculi; drainage of abscess	Recovery	5 inches long in recent state; narrow proximal end	No note
11	Meckel porducing acute intestinal obstruction of small bowel	Male	21	No note	No note	Enterostomy and removal of Meckel's diverticulum	Death	No note	No note
12	Strangulation of the small intestine over a Meckel adherent to the umbilicus	Male	11	3 days	None	Removal of Meckel	Death	6 inches long and attached to the umbilicus	No note
13	Distal extremity of Meckel gangrenous; had ruptured; also acted as a band causing intestinal obstruction	Male	33	3 days	No note	Removal of Meckel; enterostomy	Death 3 days later	Well-developed Meckel, with thin bulbous extremity which was perforated	No note
14	Acute intestinal obstruction	Male	29	3 days	None	Resection of small gut and Meckel; appendicostomy; end-to-end anastomosis of small bowel	Recovery	No note	No note
15	Intussusception of small gut due to inversion of Meckel's diverticulum	Female	3	7 days	Several; first noticed 11 months previously	Removal of Meckel	Death	Cone-shaped; 1½ inches in length; contained an accessory pancreas	Scar indrawn
16	Strangulation of loop of small intestine around a Meckel, which was adherent at umbilicus	Female	11	5 days	None	Resection of loop and Meckel and end-to-end anastomosis	Death next day	Well-developed, about 4 inches in length and adherent to the umbilicus	Healed sinus at umbilicus
17	Inversion of Meckel, producing intussusception of small bowel	Male	29	2 days	Several	Resection of loop of small bowel containing Meckel	Death	3¾ inches in length; mucous membrane at base very lax; club-shaped distal extremity	Large and protuberant

No. of Case	Lesion caused by Meckel	Sex	Age	Duration of Attack	Previous attack	Operation	Result	Type of diverticulum	Umbilica cicatrix
18	Meckel producing obstruction of small intestine	Male	19	5 days	None	(1) Enterostomy; (2) Resection of small gut containing Meckel	Recovery	Small, cone-shaped; adherent to the mesentery of the small bowel	Considerably indrawn
19	Inversion of Meckel's diverticulum, causing intussusception of small bowel	Male	8	1 wk.	No note	Laparotomy; resection of loop of bowel containing Meckel	Death	Small bulbous diverticulum 2 inches in length	Normal
20	Gangrene of Meckel's diverticulum	Male	55	1 day	No note	Laparotomy; removal of Meckel and drainage of belly cavity	Recovery	Small Meckel 2 inches in length	No note
21	Loop of small intestine adherent to old inflamed Meckel in pelvis, causing acute intestinal obstruction	Male	19	1 day	Pain in appendix region for 6 years. When removed contained threadworms	Removal of Meckel and adjacent loop of small intestine.	Death	4 inches in length; well developed; the terminal end was thin and bulbous	No note
22	Inversion of Meckel's diverticulum, causing intussusception of small bowel	Male	34	2 mos.	Attacks extending over 6 months before final attack	Enterostomy	Death	3 inches in length; gangrenous; reduction impossible owing to inversion being of old standing	Normal

diverticulum. He observed the umbilicus to be raised and dome-shaped and the overlying skin to be of a bluish tint and considerably scarred. A somewhat similar condition was met with in cases 16 and 17 of the appended series. The umbilical cicatrices were large and dome-shaped, but discoloration and scarring were absent. In Case 14 there was pronounced puckering of the umbilicus; and this was also noticed in Case 6, but the sign was not observed until after death.

The lesions produced by Meckel's diverticulum may be considered under three headings:

1. Different forms of intestinal obstruction and strangulation caused by its action as a band, or by some acquired change in its position and the formation of a loop, or acting as a pedicle in the development of a volvulus; and the production of an intussusception of the small intestine.

2. Inflammatory lesions, with the resulting changes ranging from a catarrhal condition of the mucosa to complete gangrene of all the coats.

3. Some unusual forms, e. g., when a diverticulum, closed at both ends, forms an enterocyst, or the presence of calculi gives rise to attacks of pain like appendicular colic, gallstones, hernia, etc.

The accompanying table shows that, of the 22 recorded cases, intestinal obstruction due alone to acquired adhesions occurred in 6 instances; in 2 there was strangulation of the small gut over a Meckel's diverticulum which was adherent to the umbilicus; in 7, intestinal obstruction resulted from inversion of the diverticulum, producing intussusception of the small bowel; and in another the diverticulum remained attached to the umbilicus, causing a secondary volvulus of the lower ileum, cæcum and ascending colon. In the remaining 6 cases there was evidence of inflammatory changes in the diverticulum. Three of them had perforated and caused peritonitis, and those remaining showed gangrene without perforation.

Of the 3 cases in which gangrene had occurred with perforation, 2 were associated with intestinal obstruction, which was the primary factor leading to arrest in the circulation of the diverticulum; while in the third, acute inflammation alone was present.

A primary acute diverticulitis is a rare occurrence: a case is recorded by Gray[1] in which neither torsion of the diverticulum nor intestinal obstruction was present.

In Case 15 there was a healed sinus at the umbilicus, which had previously discharged.

On the other hand, I may mention that I have frequently found the umbilicus raised or indrawn in subjects dead from other causes, where no Meckel's diverticulum was present. But with symptoms of an acute abdominal attack, this sign may be held to

be suggestive of the diagnosis of a Meckel's diverticulum, though it cannot be regarded as conclusive.

CONCLUSIONS

1. A persistent Meckel is a decided source of danger.

2. The definite lesion resulting from it is largely determined by its anatomical form; e. g., small Meckels with broad bases are most likely to cause intussusception.

3. Owing to the rarity of Meckel's diverticulum (2 per cent in bodies examined), acute inflammatory lesions resulting from it are necessarily uncommon.

4. The symptoms may be precisely similar to those that arise in connection with lesions of gall-bladder, intestine or appendix. The pathology is practically the same, and the diagnosis may be impossible. The appendix is most commonly mistaken.

5. Changes at the umbilicus may aid in the diagnosis of a diseased Meckel.

I wish to thank the surgeons on the staff of the Royal Victoria Infirmary for allowing me to make use of their cases.

ACUTE DILATATION OF THE STOMACH AND ITS TREATMENT

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At the November meeting of the Christiania Surgical Society in 1907, a paper was read on the post-operative acute dilatation of the stomach, whereupon a lively discussion ensued. On reading through the report of the meeting one will notice that that side of the subject which aroused especial interest was the etiological, or in other words the purely scientific, question as to the still obscure origin of the disease. The practical side, the treatment, was, comparatively, only superficially referred to. The repeated use of the stomach tube was recommended, also rectal feeding, saline enemata or hypodermoclysis. All were agreed as to the early and repeated use of the stomach tube, both as a diagnostic remedy and as the most important therapeutic agent. That even this, however, is too often without avail was proved by the fact that of four mentioned cases of acute post-operative dilatation of the stomach treated in this way, two ended fatally. Several speakers implied, however, that they had seen lighter and quickly transient instances of this illness.

My experiences later aroused my interest in the acute dilatation of the stomach. It struck me as strange that a remedy suggested by Schnitzler — according to testimony an extremely efficacious one — to let the patient lie prone in bed, was not mentioned during the discussion in our surgical society. Half en passant, the lecturer said, it is true, that knee-chest position had been tried during the after treatment, on account of the hypothesis that arterio-mesenteric compression may be the cause of an acute dilatation. Likewise, Kelling's suggestion to place the patient on his left side with elevated pelvis was mentioned. But Schnitzler's methodical procedure as the principal or only treatment was not brought forward. A closer acquaintance with the literature has taught me that this topic, when discussed, generally has been treated in the same manner as with us — the etiology has engaged the interest to the exclusion of the treatment.

With an illness so fatal as the acute dilatation of the stomach, contributions to the treatment can claim abundant space. An addition to the hitherto few examples of the effect of postural treatment seems specially to possess a considerable and dual interest. In the first place, it is of importance, on account of the treatment itself, to prove this effect, which is still denied by many. Secondly, the effect of the abdominal posture once proved beyond doubt, a new light is thrown

on the obscure etiology of the acute dilatation of the stomach. In this paper it is my object, primarily, to illustrate by my own cases the effect of the abdominal position in acute gastric dilatation. Secondly, I shall try, by a collection of the cases which have been published since the abdominal posture's first use in 1895, to put the different ways of treatment to the test. Finally, I use the striking effect of the prone position and the chief clinical characteristics of the acute gastric dilatation as arguments in the discussion of the etiological question. I have added two cases which were not treated with abdominal posture; this was done to publish known cases of this disease.

CASE 1. A. S., a widow aged 53, was admitted to Diakonhjemmet February 22, 1910, with a diagnosis of chronic appendicitis; discharged April 13. Family history good. Her present illness dates back two years. It commenced suddenly with an attack of pain in the abdomen, accompanied by vomiting and a soreness below the right costal margin. She got up again after three days, but felt unwell, was without appetite, and with any movement the pain revived in the affected part. This condition changed two days later quite as suddenly as her illness usually commenced, with a more violent attack than she previously had had. The pains had their seat in the whole of the abdomen, but perhaps most acute in the epigastrium, and were first alleviated, after 24 hours' duration, by an injection of morphia. An attack of pneumonia now kept her in bed for 16 days. In August, 1908, and during the last three weeks, she had had similar but somewhat slighter attacks, with two to three days in bed. Jaundice has never been noticed.

Present condition. The patient is a well-preserved, fairly stout woman, somewhat pale but with no appearance of an invalid. Kidneys and thoracic organs sound. Abdomen large but soft. Liver not enlarged, gall-bladder not palpable. Patient is tender below the right costal margin and in the cæcal region. T., vesp., 36.4; P. 92.

Operation. Appendectomy and cholecystectomy were performed under scopolamin-morphin-ether. The appendix, which bore traces of an old pathological process, was removed. Thereupon the gall-bladder was excised. It was firmly connected with the duodenum and full of stones right up to the proximal end of the cystic duct.

One hour before the operation the patient was given subcutaneously ¼ mgr. scopolamin, and 40 minutes later 1 cgr. morphia and 1 ccm. oleum camphoratum. The narcosis took place through an open gauze mask; patient became unconscious after 11 minutes, with a consumption of 30 ccm. ether. The narcosis lasted 2½ hours, was easy and without complications of any kind, and was not followed by sickness; 240 ccm. ether were used.

Feb. 27.— T. 37, 37.1; P. 100. Patient feels well, has slept fairly well. Appearance good. No vomiting since the operation. Allowed to drink water gruel and water. The urine has to be taken by catheter.

Feb. 28.— T. 36.9, 36.7; P. 92. Condition and appearance good. Flatus has been passed since yesterday morning. Patient has drunk about 100 ccm. water gruel in the last 24 hours, and on account of thirst a large amount of water, much more than usually permitted. Yesterday afternoon, without preceding indisposition, she vomited twice with half an hour's interval, a thin greenish fluid without odor. Since yesterday evening she has received saline enemata, which are still continued. The wound shows no reaction.

March 1.— T. 37.2, 36.8; P. 92. Patient still feels well; she drank 200 ccm. water gruel and a little water in the last 24 hours, without vomiting. Extreme thirst. Saline enemata 4 to 6 times daily.

March 2.— T. 37.1, 36.9; P. 96. During the last 24 hours she has drunk the same amount of gruel and water as before. She complained yesterday afternoon of heaviness and fullness in the chest, also a bitter taste. Four or five times in the course of the night she vomited small quantities of fluid similar to that of the day after the operation. She complains still of oppression and an intolerable thirst. During the morning visit, partly through an introduced stomach tube and partly by vomiting, about 1½ litres of thin, greenish fluid, which now has a nauseating odor, was emptied. The patient afterwards felt much better and easier, but excessively thirsty. Saline enemata are continued.

March 3.— 36.9, 36.1; P. 104. In the last 24 hours she drank only 50 ccm. water gruel and very little water. During the evening visit yesterday, one litre was evacuated by the stomach tube. Notwithstanding the abundant supply of fluid through the rectum, her thirst is overwhelming. Flatus has been passed since the day after the operation. Yesterday evening the bowels moved spontaneously. Yesterday morning about ¾ litre of thin, greenish fluid was emptied by the stomach tube; it gave bile reaction.

At the evening visit the patient's condition is the same. The appearance is still fairly satisfactory, but she complains of fullness and unquenchable thirst, worse than ever. The abdomen has during the whole time been distended, mostly above the navel, but the distention now reaches to 8 to 10 cm. below the umbilicus, chiefly in the left side.

During the last two days I had not for a moment doubted that the case before me was one of post-operative gastric dilatation. This supposition was strengthened by the excessive thirst, absence of peritonitis, and intestinal obstruction, and further by the fact that

despite the regular evacuations by the tube the stomach not only had remained distended but during the last 24 hours evidently had increased in size.

As a guide to treatment, my first thought had been the discussion in our surgical society, which I read over, but the modes of treatment mentioned there were evidently not fully efficient. The objection might be made that my patient was continually allowed to drink, but her thirst was so extreme that it seemed altogether inhuman to prevent her from so doing. Under these circumstances I was obliged to seek other sources of information in the literature at hand. I sought for some time in vain, but ultimately in Moynihan [1] I found the following: "In my own few cases, relief has always been given by changing the position of the patient. He must be placed prone in bed." I was soon to have use for my newly acquired knowledge.

March 4.— T. 36.3, 36; P. 116. The patient's appearance has since yesterday evening undergone a striking change. Her face is hollow, and its expression inert. Death seems near. Her pulse, which the whole time has been unalterably full, is now nearly thready, and the patient herself whispers that she has not many moments left.

During the last 24 hours she has drunk 500 cm. water and gruel and received 6 rectal enemata; but her thirst is the same. The distention of the stomach has further increased. With a stomach tube we emptied 1½ litres of fluid of the same appearance as before, but with a more unpleasant odor. The tubing brought little or no relief.

At 12 o'clock midday we laid the patient on her chest, with a pillow under the pelvis and one under her shoulders and throat, which induced the exclamation, "Oh, that was nice!"

From the moment she came in that position, her condition has changed. Vomiting has ceased altogether, and all feeling of fullness and pain in her abdomen is swept away. She declares she has become another person, and the change in her appearance in the course of half an hour is a perceptible corroboration of the fact.

March 5.— T. 36.3, 36.8; P. 116. The patient has lain prone in bed nearly the whole of the time since yesterday midday. Now and then, for a moment's change, she has lain on the right side, but prefers to lie on the abdomen. She says she feels well; her appearance is good, and her face has resumed its former plumpness. Since yesterday midday she has taken 600 ccm. water gruel, 1½ litres milk, four eggs, and a little water now and then, all without the slightest inconvenience. Although she has besides received four saline enemata, she is still thirsty. "It is nice to get plenty to eat and drink now," were her first words this morning.

At the evening visit, for safety's sake, we introduced the stomach tube. This brought up only 50 ccm. from the stomach. The fluid was gray-brown (water gruel) and without odor. It had thus, since the morning, changed both in substance and color. In the night the patient twice passed urine spontaneously. Proctoclysis was discontinued and fluid food allowed without restriction.

March 7.— T. 36.9, 36.9; P. 96. Patient still lies prone in bed and has slept comfortably in that position. She looks and feels well, but is still thirsty. She is now placed on her back.

March 8.— T. 36.5, 36.5; P. 100. Has in the last 24 hours lain mostly on her back, and drunk more than the day before. Feels extremely well, and is allowed solid food.

Her further progress presented no complications. According to report of May 15, 1912, the patient has been and is quite well.

CASE 2. Gunda P., married, aged 27; entered Diakonhjemmet August 7, 1910; discharged August 30. Patient's family history good; always been well herself. Menstruation in order from 15th year till a fortnight ago, when it failed to appear. Patient has had no children or abortus and has never been troubled with indigestion.

While dressing this morning the patient was suddenly attacked by violent pains in the lower regions of the abdomen. After a while she felt better, but with new movement came an even more severe attack, so that she nearly fainted. She could hardly reach the sofa, where her husband found her, white as death and half unconscious. A doctor was called in and sent her to our hospital.

Status.— The patient is in extreme anæmia; all mucous membranes bloodless. P. 96; T. 36.3. Lungs and heart are in normal condition. Abdomen slightly distended and extremely tender over the pubes, where there is a dull zone of 8 to 10 cm. Urine normal.

Exploration reveals a soft tumor behind the uterus, most prominent in the middle line. The uterus is displaced upward and forward, lying close behind the pubic arch. After exploration a new attack of pain ensued, wherefore we at once prepared to operate.

Operation. Salpingotomia dextra was performed at 12 o'clock noon. Upon opening the abdomen a quantity of blood, partly fluid and partly clotted, was seen to occupy the lower part. The source of the hæmorrhage was the right tube, which formed a walnut-sized tumor, the top wall of which had burst in its whole length. The tube was ligated and excised, the blood scooped out, and the abdominal cavity cleaned as well as possible.

Twenty minutes before the narcosis, 1 cgr. morphia was given subcutaneously. The — anæthetization — on open gauze mask — commenced at 12.10.

[1] "Abdominal Operations," 2nd ed., p. 85.

Unconsciousness supervened 10 minutes later, after 55 ccm. of ether. The whole amount of ether used was 170 ccm. The narcosis was easy and without complications of any kind.

Aug. 8.— T. 36.1, 37.3; P. 80. Tongue clean, humid. Yesterday afternoon, in connection with the operation, patient vomited four times. After 1 cgr. morphia subcutaneously she slept fairly well. No sickness in the night. To-day white as death, languid, with widely dilated pupils. Abdomen hollow, soft, and not tender. Patient is very thirsty. She has been given milk and water by teaspoonfuls; but she has, it is stated, on account of the fearful thirst, drunk much more than permitted.

Aug. 9.— T. 38.3, 37.2; P. 108. Later in the morning the patient began to vomit and complains of violent pain in the epigastrium. In the course of the day she has vomited 8 times — a thin gray-brown fluid with no odor. At the evening visit she still complains of severe pain. She has been given 1 cgr. morphia and ingesta of any kind is forbidden. Vomiting has continued part of the night, however, sometimes without anything coming up. To-day there is some distention and tenderness in the epigastrium and the whole of the parts above the navel, while the abdomen below the navel is neither tender nor distended. With the stomach tube ½ litre gray-green fluid was evacuated. The patient is still forbidden to eat or drink.

At 8 P.M., flatus has been passed since the middle of the day, 48 hours after the operation. Although the patient has not drunk anything, vomiting increases, the vomit to-day being greener and containing bile. Pain unchanged, also thirst. The abdomen is more distended in its upper and left part, and by percussion splashing sounds are heard. The patient feels very ill, and declines absolutely to have a stomach tube introduced. *She is laid prone in bed, with a pillow under the chest and throat and one across the groin.*

Aug. 10.— T. 38.2, 37.1; P. 100. The patient slept well during the night. She lay yesterday evening first for ¾ hour on the abdomen, then the same length of time half on the abdomen and half on the right side. She slept lying on her left side, and slept the whole night; from the same moment she lay prone in bed, her pains and desire to vomit ceased.

When she woke this morning, she lay of her own accord on the abdomen, and drank an aleglassful of barley gruel and half a glass of milk without any unpleasantness before the morning visit. Her appearance is totally changed. She is smiling and pleased.

Aug. 11.— T. 38, 37.4; P. 84. The patient is pale, but her appearance further improved. Yesterday morning she drank plenty of milk without inconvenience. She lay yesterday nearly the whole time on the abdomen, much more than was required of her, as she was quite convinced that it was that, which had relieved her of the pain and vomiting. For dinner she ate some fish and milk soup; for supper, porridge and milk, all with satisfaction. In the middle of the night she woke and turned over on her back, and slept thus until the morning. She ate breakfast to-day with a good appetite. The abdomen is now more distended than before, but the distention is even. There is no tenderness.

Aug. 12.— T. 37, 37.3; P. 80. Perfectly well. Eats and drinks as if nothing had occurred.

The patient was discharged August 30, in excellent condition, and informs me, May 10, 1912, that she has been quite well ever since.

CASE 3. P. A., aged 43, male; was admitted to Diakonhjemmet August 26; died September 29.

His illness began three years ago with an attack of three weeks' duration. He had abdominal pain several times a day, with eructation of acid fluid followed by one or more vomitings. He also vomited regularly directly after meals. When the attack was over he felt comparatively well, only feeling slight pain now and then, sometimes accompanied by eructations; but he was always able to do his work. He was taken ill again a fortnight ago with epigastric pain radiating backward. The pain began suddenly from ¼ to 1 hour after meals and lasted for about an hour, not appearing unless food was taken. During this last attack the patient had no eructation or vomiting. In the course of the last month he has noticed a rapidly increasing swelling of the scrotum.

On admission he complained of such violent pain in the left hypochondriac region and back that he could not lie down. The abdomen was moderately distended; there was exquisite tenderness below the left costal margin, and on the right side some rigidity. The right margin of a flat, immovable tumor is felt on the posterior abdominal wall a little above the navel. On physical examination, heart and lungs were found normal. Urine: sp. gr. 1015; no albumen, no sugar. The left testicle forms a firm, even, and not tender tumor, the size of a closed hand.

Operation. Sept. 4. Pericolitic adhesions of the common type were found on the ascending colon and the hepatic flexure. The upper part of the ascending colon was compressed and its lower part, with the cæcum, decidedly distended. The adhesions were separated till the bowel was freed. Stomach, duodenum, and gall-bladder showed no irregularity. Behind the pancreas a firm retroperitoneal tumor, thicker and broader than a hand, adheres to the spine, and extends on the left side upward to the diaphragm.

Ether narcosis: 25 minutes before the anæsthetization, 1.5 cg. morphin was given subcutaneously. Narcosis supervened after 15 minutes, requiring 55 ccm. ether; it lasted for 57 minutes; the operation, 40. Total consumption of ether, 165 ccm. The narcosis was easy and without complications.

Sept. 5.— T. 36.7, 36.6; P. 80. The patient has borne the operation well. General condition very good. No vomiting since the operation, and 18

hours later flatus was passed. Fluid was allowed ad libitum.

Sept. 6.— T. 36.7, 36; P. 108. No vomiting until last night at 9. The patient has since vomited four times, and altogether 2 litres of thin, greenish and odorless fluid. He complains of fullness in the epigastrium, moderate pain, and severe thirst. His aspect is unaltered. By stomach tube 800 ccm. greenish brown fluid were evacuated. Food and drink forbidden. Proctoclysis.

Sept. 7.— T. 36.8, 36.5; P. 124, and scarcely perceptible. After the gastric lavage yesterday morning the patient felt relieved and the vomiting ceased for 8 hours; it then reappeared and gradually increased in frequency. During the last few hours there has been an interval of only 5 to 10 minutes between the vomitings, but during the night not more than about 500 ccm. have been vomited. The patient complains of abdominal distention and moderate pain; thirst worse than ever. His aspect and general condition have undergone a striking change since yesterday. His face is livid and pinched, his eyes hollow, and nose and extremities cold. The upper part of the abdomen is moderately distended, and by percussion and shaking splashing sounds are elicited, and show that the greater curvature in the left side lies three fingers' breadth below the umbilicus.

By the stomach tube, directly after a vomiting, 900 ccm. thin, black fluid were evacuated, which contains blood but gives an indistinct bile reaction. As the diagnosis, acute gastric dilatation, seemed certain, *the patient at 9 A. M. was placed prone in bed.* It was difficult to find a position that did not cause pain in the abdominal wound, but at last we succeeded. Absolute diet and proctoclysis were continued.

Sept. 8.— T. 36.3, 36.6; P. 100, fairly good. Since yesterday morning the patient has been prone; for a change he has lain on the right side only for 15 minutes every other hour. Since he was turned over on the abdomen he has felt quite well; all nausea and vomiting have disappeared, and his aspect is completely changed. His face has regained its natural expression and fullness.

Last night and this morning a stomach tube was introduced, and by aspiration 20 ccm. black, to-day 130 ccm. greenish, fluid were evacuated. Abdominal posture and proctoclysis were continued.

Sept. 9.— T. 36.6, 36.2; P. 96. Last night, through the stomach tube, 20 ccm. light green, and this morning 15 ccm. greenish, fluid were aspirated. General condition good, although the patient has slept little on account of the discomfort from the abdominal wound caused by the prone posture. The stomach is not distended, and no splashing sound has been elicited since the postural treatment began. Fluids allowed in restricted quantity.

Sept. 10.— T. 36.8, 36.1; P. 96. The patient last night lay semi-prone on the right side and slept fairly well. He enjoys his fluid nourishment. On the whole, no sickness or vomiting have occurred during the last three days. Solid food and ordinary posture are allowed.

Sept. 22.— Uninterrupted satisfactory reconvalescence without gastric symptoms till last night. The patient then, after a chill, had pain in the right side of the chest and began to cough. The formerly normal temperature rose to 38.5. To-day, examination reveals a pneumonia of the inferior lobe of the right lung.

Sept. 29.— The patient gradually lost strength, and died on the seventh day of the pneumonia.

Post-mortem. The stomach was found normal, with the exception of two small ulcers at the lesser curvature. The tumor of the testicle proved to be a sarcoma, and the retroperitoneal tumor in the upper part of the abdominal cavity a metastasis to the prevertebral connective tissue.

The two following cases, which are of much interest and have not been published before, were kindly submitted by Dr. P. Bull.

Case 4. N. H., boy 9 years old. From his earliest years he has had "a sensitive stomach." He felt oppressed sometimes, and had pains under his chest after meals. January 31, 1912, he had a severe attack of appendicitis. On February 4, appendectomy was performed in his home under ether-chloroform narcosis, and a pelvic abscess incised and drained.

Feb. 5.— Since the operation the patient has been restless and has frequently vomited a black fluid. T. 38.6; P. 140.

Feb. 9.— T. 36.8; P. 88. Patient has become better little by little, and his condition has been fairly satisfactory during the last few days. To-day fæcal matter is seen to escape through the wound.

Feb. 15.— The patient has been moved from his home in the country to "Red Cross Clinic," Christiania. His appearance and appetite are improved. The wound is wholly open; in its upper median part the lesser bowel is slightly protruding, and on its surface two small perforations are visible, which discharge thin yellow fæces, while only now and then slight flatus has been passed through the anus.

Feb. 17.— After an enema yesterday a moderate quantity of fæcal material was evacuated. To-day, spontaneous movement of the bowels. Appetite satisfactory.

Feb. 23.— During the last two days all discharge from the intestinal fistulæ has ceased. In the night at 2:30, the boy had a severe attack of pain in the middle of the abdomen and has since lain in unceasing misery. This morning he vomited four times and twice had normal relief of the bowels. The abdomen is not distended but is somewhat tender. No fever; pulse 84, good.

Feb. 24.— No fever; P. 80. Since yesterday one thin greenish vomiting. Flatus passed. Patient complains of pain in left side of abdomen, where he is tender. The rectal wall is somewhat prominent and tender to the left. Under chloroform, a para-

rectal abscess is incised and a tablespoonful of thin pus is emptied from a cavity the size of a walnut, which is then drained.

This evening, since awakening from the narcosis, the patient still lies and screams with pains in the abdomen. Has twice vomited a small quantity of thin greenish fluid. Pulse 90. No flatus and no discharge from the fistulæ. The abdomen is tender, still only slightly distended, and with no noticeable change in its shape. No dullness and no splashing sounds. The patient is much too restless for any thought of stomach tube.

Dr. Bull concluded that there existed a high intestinal obstruction, and at 7:30 in the evening a laparotomy was performed under chloroform; 12 cm. median incision with the navel as a center.

No fluid in the abdominal cavity. The small intestine was found in two places to be adherent to the short omentum and to the abdominal wall, from which it was easily separated. Directly above both adhesions the intestine is a little, but very little, distended; but the greater part of the intestinal portion lying between both adhesions is collapsed. The same is the case with the whole of the small intestine below the lower, and the greater part of the small intestine above the topmost adhesion, right up to the duodeno-jejunal plica. Near this is found a transversal, strongly distended, gray-red intestine, which proves to be the horizontal part of the duodenum. Its dilatation ends suddenly at the point where the mesenteric artery, tightly strained, runs in front of the duodenum.

The reason for the compression of the duodenum by the mesenteric vessels cannot be decided. There are no loops of the small intestine in the pelvis; this is shut off from the abdominal cavity by the adherent S romanum and its mesosigmoideum. The adherent lesser bowel does not seem to have exercised any traction on the mesenterium, nor does the perforated loop, which belongs to the lower part of the ileum, exert tension in any direction. The distention of the duodenum is unmistakable at any rate, and the only thing of consequence discovered by the operation.

The stomach is globular in shape and somewhat distended, but the greater curvature lies 3 to 4 fingers' breadth above the navel.

The wound was closed without anything being done to the duodenum or the strained transverse mesocolon. The operation lasted about an hour. Directly afterwards, a subcutaneous saline infusion of 1 litre was given.

Feb. 25.— No fever; P. 90. The patient has been restless during the night, and screamed as before. He has vomited four times. In consequence of the discovery made at operation, *the patient is laid prone in his bed.* The very moment he was placed thus he said, "That is nice." He is allowed to drink water.

Feb. 26.— T. 37.4, 36.5; P. 120, 90. The patient slept on his abdomen 4 hours during the night, and was quiet. Vomiting and the earlier screams and intractability have all ceased since he was placed on his chest. Likewise, the discharge through the intestinal fistula, which since February 21 had entirely ceased, has now recommenced. General condition better. Continues to lie on the abdomen and feels well thus.

Feb. 27.— Without fever; P. 90, 84. The patient is quiet, has not vomited, and slept nearly the whole of the night in the abdominal position. He has now lain 48 hours on his abdomen, only now and then being moved half on his right side half on his left, a short while at a time, for a change. He is now moved onto his back and given liquid food. Later, continued improvement without complications.

The intestinal fistula on the ileum was closed under chloroform by enterorrhaphy on March 28, and the patient left for home in good condition on May 1.

CASE 5. R. K., aged 65, a doctor in Christiania; treated at home. He had for 25 years suffered from indigestion now and then, but never had been ill enough to have to neglect his practice. During his holiday trip in August, 1912, he had diarrhœa and felt tired for a fortnight, but had improved considerably, when on August 25 he was taken ill with nausea and epigastric pain.

Aug. 30.— During the last five days the patient has had attacks of pain below the right costal margin, where a formerly more diffuse tenderness has become localized and increased in intensity; in the same place he feels an inspiratory "catch," and sometimes the pain radiates to the chest. He feels sick, especially with movements of any kind, but does not vomit. There is a constant muscular rigidity on the right side of the slightly distended abdomen. The temperature has risen a little, and once has reached 38. Urine concentrated. without albumin or bile. The condition is regarded as subacute cholecystitis.

Sept. 4.— The pain, fever and rigidity have disappeared, but there is still some tenderness below the right costal border. Flatus has been passed the whole time. Yesterday and to-day, without inconvenience, the patient has had tea, toast and milk gruel, after having been without food or drink for three days.

Sept. 5, 6 P. M. — The patient awoke at 4:30 this morning, feeling extremely giddy. Shutting his eyes, he felt better; but looking up, everything in the room seemed in a whirl. He began to vomit a thin bile-stained fluid. The vomiting came on again every time he took any fluid, with little evacuation at a time, but in the course of the day about 1 litre. No flatus since yesterday. When Dr. Bull saw the patient in the afternoon, he found him greatly altered since the previous day. His look was apathic, his face pinched, his extremities cold and clammy; the formerly normal pulse was thready, with a frequency of 92. The abdomen was, in the left hypochondrium only, a little distended, but nowhere tender or rigid. By percussion the gastric

sound was found to extend from the left fourth rib in the mammillary line to the umbilicus. There was no fever. As the condition was diagnosed as acute gastric dilatation, the patient was given choice between stomach tube and abdominal posture, and preferred the latter. At 6:30 P. M. he was placed prone in bed supported by a number of pillows. Food and drink were forbidden.

An hour later Dr. Bull saw the patient again, and found his hands warm, the face normal, the pulse 100 and full; the nausea had ceased and the general condition was satisfactory.

Sept. 6.— The patient remained prone till 1 A. M.; he was then turned on the right side. Since the abdominal posture was adopted, he has not vomited, nor has he felt sick or giddy. From 11 last night flatus has been passed.

Sept. 7.— Still no vomiting. Since yesterday the patient has taken 200 ccm. milk and water and a little bread.

Sept. 21.— Uninterrupted recovery. The patient has neither felt giddy nor sick since the 5th. There has been no abdominal pain or tenderness nor any gastric symptoms. The daily ration has successively been increased and has now reached 1300 calories.

Dr. Bull adds the following epicrisis. The patient had on the 25th of August probably acquired acute gastritis, perhaps caused by intestinal infection. In addition to this a slight peritonitis localized to the epigastrium and right hypochondrium developed, which, from its course, probably was owing to an acute cholecystitis. When the illness had abated and the patient began to take some nourishment, symptoms of acute gastric dilatation suddenly developed. As a peculiar and, to the patient, distressing inaugural symptom of the dilatation, the intense giddiness has to be noted; 12 hours later characteristic signs of collapse were present. The effect of the postural treatment was particularly noticeable within an hour, not only to the doctors who were present, but also to the patient himself and to his relatives.

The following two cases from the Rigshospital were not treated with abdominal posture.

Case 6. A. I., male, 20 years old; sent to the Rigshospitals Surgical Division B, May 29, 1907, for tuberculosis of the kidneys.

The patient has always been hoarse and prone to colds and cough, but otherwise well, and especially free from gastric troubles. His present illness commenced a year ago with painful and continual passing of urine. This condition has become worse by degrees, though the patient's general condition and appearance have suffered but slightly.

Operation. June 5, nephrectomia dextra was performed under chloroform.

June 6.— T. 37.2, 36.3; P. 100, 96. Since the operation, vomited four times; quantity of urine 950 ccm. Milk and barley water given in teaspoonfuls.

June 7.— T. 36.8, 37.1; P. 130. Very restless during the night on account of pain over the whole of the abdomen, which was somewhat distended and tender yesterday evening. He was given a rectal enema of ¾ litre yesterday evening, after which the bowels moved freely. He vomited a thin yellow-green fluid several times yesterday, also during the night at short intervals.

This morning with the stomach tube we emptied 1 litre greenish fluid, which eased the patient. In the course of the day he was given 3 camphor injections and 1 of digalen. Amount of urine 750 ccm.

June 8.— T. yesterday evening 37.8; pulse thready, uncountable. The patient is quite conscious but somewhat restless, and complains of fullness and pain in the abdomen. Vomited twice yesterday. The whole abdomen, but especially the epigastrium, is distended and tender. Yesterday midday he had a subcutaneous saline injection of 1 litre, without noticeable effect. During the night much restlessness and vomiting. Senses clear. Every ½ hour 1 ccm. oleum camphoratum was given subcutaneously, and yesterday evening a digalen injection. Patient died at 4 o'clock this morning.

At post-mortem tuberculosis of the bladder and left kidney was found, also considerable dilatation of the stomach and duodenum.

Case 7. Th. M., male, aged 27; sent to the Rigshospitals Surgical Division B, October 16, 1910, for osteomyelitis tibiæ.

The patient has, during the last three or four years, felt pains in his right leg when he exerted it; otherwise he has been well. Last week he had violent pains and tenderness under the right knee, and one or two chills. His temperature throughout has been between 38 and 39°.

Operation. October 16, osteotomia tibiæ was performed under scopolamin-ether narcosis. A small abscess, which extended into the medullary canal, was opened and thoroughly exposed with a chisel.

Oct. 21.— Fever of a septic type, due to a suppuration of the knee joint. This was incised on both sides and a considerable quantity of pus evacuated.

Oct. 24.— Condition much better, senses clear, but continued high fever.

Nov. 2.—The skin over the tendo Achillis is necrosed. The fever has by degrees somewhat diminished.

Nov. 14.— T. 37.6, 36.3 Since last night the patient has vomited as soon as he has partaken of food. To-day the left side of the abdomen is tender, and distended from the epigastrium to the pubes. The right side of the abdomen is not distended, but on the contrary is rather hollow.

Nov. 15.— Distention of the abdomen has increased and now reminds one of a strongly dilated stomach. There is much tenderness, muscular rigidity, and dull percussion sound in the distended part, which seems fluctuating. The tenderness, however, is so excessive that no examination is possible. The patient died at 4 o'clock this afternoon.

Autopsy. General sepsis, pericarditis, miliary abscesses in the kidneys, parenchymatous degeneration of the spleen and liver, dilatation of the stomach and duodenum.

The greatly dilated stomach reaches midway between the umbilicus and the symphysis; the duodenum, the common, cystic and hepatic ducts are also considerably distended.

The following synopsis is based upon 144 cases of acute dilatation of the stomach — the 7 referred to above and 137 from the literature. With the exception of Jessop's and Hochenegg's two cases, which are included to complete the list of dilatations of the stomach treated by operation, all the others, which are culled from literature, date from later than 1895, the year in which Schnitzler suggested laying the patient prone in bed as a treatment for the illness. Thus, my work is partly a continuation of the latest published literary works of the American authors Conner and Laffer.[1]

Of 130 cases where sex is mentioned, 78, or 60 per cent, were women and 52, or 40 per cent, men. The 118 cases where age is mentioned belong to the following decades:

1st decennium	1 case,	or 0.8 per cent
2nd decennium	21 cases,	or 17.8 per cent
3rd decennium	32 cases,	or 27.1 per cent
4th decennium	30 cases,	or 25.4 per cent
5th decennium	20 cases,	or 16.9 per cent
6th decennium	10 cases,	or 8.4 per cent
7th decennium	4 cases,	or 3.4 per cent

This goes to prove the same proportion which Conner has found, that three fourths of the patients acquired their illness between the tenth and fortieth years. Payer has the youngest patient, a boy 4 years old; and P. Müller the eldest, a woman of 65.

If one takes into consideration the condition of the patients when the dilatation of the stomach began, which must be supposed to have more or less affected the development of the dilatation, we can divide the cases into several groups, some of which are well defined.

1. *The post-operative cases* contribute the largest number, with 92 cases out of 138 in which the condition when the dilatation occurred is mentioned, or 66.6 per cent. Laffer's review of the literature from 1908, without doubt the most complete printed, but which includes all earlier known cases, has by comparison only 38.2 per cent post-operative cases.

Of 92 operations, 71 are laparotomies and 21 extra-abdominal operations. Among the laparotomies, operations on the female genital organs give the largest and operations on the gall system the next largest contingent, with 30 and 17 cases respectively; after these come 8 appendix and 3 hernia operations, together with 7 intra-abdominal operations of different kinds, and finally a most remarkable secondary group, consisting of 6 operations on the stomach itself, 1 pyloric resection, 4 gastro-jejunostomies, and 1 gastroduodenostomy (Tschudy, Zade, Haberer, Payer, Schilling, and Finney). Of the 20 extra-abdominal operations, 5 were performed on the kidney, 8 on the extremities, and 1 on the face; the rest were on the thorax.

All the operations, with one exception, were performed under general narcosis. The narcosis administered was in 12 cases chloroform, in 8 ether, in 5 chloroform-ether, in 1 chloroform-ether-oxygen, in 2 chloroform-morphia, in 4 ether-scopolamin-morphia, in 1 ether-scopolamin-morphia after veronal, in 3 ether-morphia, and in 1 ether-morphia-atropin. The statement made by von Herff and others, that chloroform is specially responsible for post-operative dilatation of the stomach, seems thus not consistent.

In 66 post-operative cases one could approximately decide the time for the appearance of the dilatation of the stomach. In 23 cases the illness commenced within the first two days. One will, however, be in doubt as to the time for the greater number of those cases belonging to the first 24 hours, as the symptoms of the dilatation under these circumstances are not easy to distinguish from narcosis vomiting. The illness commenced three days after the operation in 19 cases, about four days after in 5 cases, and five days later in 4 cases; 1 case dates from the sixth day and 2 cases from the seventh. It is thus shown that the majority of post-operative dilatations of the stomach commence about the third day, much oftener before than later.

[1] The collection from the European, especially the German and Scandinavian, literature is at any rate nearly complete, as, to the best of my knowledge, all certain cases of acute dilatation of the stomach mentioned between 1895 and 1910 are included. From the English and French, but especially from the American provincial, literature, many are wanting. My collected references show which authors' cases are used.

It has even been observed that distention of the stomach can occur during the operation. Moorhead seems to have met the dilatation, so to say, in statu nascenti; during a laparotomy after a completed perineorrhaphy he noticed a tumor suddenly forming in the abdominal cavity; the tumor was incised and proved to be the stomach, which was then emptied by a tube.

On the other hand, some stray instances are found where the dilatation occurred much later than mentioned above. Thus, Chavannaz saw it commence the ninth, Mayo Robson the tenth and fourteenth, and Nakahara the sixteenth day. In our Case 7 the illness commenced on the twenty-fourth and in Jessop's case the thirtieth day after the operation. These gastric dilatations which appear so late, after the effect of the narcosis and the operative insult must be considered as having passed, cannot correctly be termed post-operative. Then such cases may either be referred to an incidental cause during reconvalescence or to a severe illness following upon the operation. In Nakahara's case tetanus supervened; in our Case 7, general sepsis. Such cases ought perhaps to have been noted under the next group.

2. *Dilatation of the stomach which has arisen during the course of an acute illness or its reconvalescence.* Fifteen cases belong to this group; 7 caused by pneumonia, 4 by typhoid fever, and 1 each by scarlatina, acute rheumatism, endocarditis, and cholecystitis.

Dilatation occurred during pneumonia in Hanssen's, Lehmann's and Box and Wallace's cases on the fifth day of their illness, in Herrick's case on the ninth, and in Leonhardt's 2 cases the eighth and sixteenth days, respectively.

Among the cases of typhoid fever, Wichern's 2 patients developed dilatation of the stomach after 21 and 26 days, Bäumler's in the fifth week, and Heine-Ewald's "during reconvalescence." Likewise Albu's and Bloodgood's patients were reconvalescents after scarlatina and acute rheumatism, and my patient No. 5 after cholecystitis. At what stage of his endocarditis Mayo Robson's patient developed dilatation is not mentioned.

It is stated that Bloodgood's and Bäumler's patients had good appetite during the last few days; Wichern's patient No. 2 had kyphoscoliosis. As regards the others in this group, no mention is made of any fact which can have contributed to the development of the dilatation. In my Case 5, the dilatation began after the first food taken after 3 days of fasting.

3. *Dilatation during chronic illness.* Of such cases we find two during consumption of the lungs (Conner, Hanssen), 1 during diabetes (Hanssen), 1 during sciatica (Bäumler). The patients here referred to are as a rule emaciated and exhausted, in a debility which nearly equals a post-operative state; but the group also includes cases in good condition. In Conner's case one comes to the conclusion that an irregularity of diet or overfilling of the stomach was probably the incidental cause. It is mentioned that the patient had eaten better a day or two preceding the dilatation. In one of Hanssen's cases (No. 9) the dilatation, which was not observed during life, seems to have arisen just before death; while his other patient belonging to this group (No. 8) was in comparatively good condition. In none of the cases do we find any mention of an incidental cause; in Bäumler's case (No. 2) it is positively stated that irregularity of diet or other incidental cause was not traceable.

4. *Dilatation of the stomach by disorder or deformity of the spine.* Under this heading we find Kelling's case of highly developed lumbodorsal scoliosis and 6 cases of spondylitic kyphosis with or without scoliosis (Kirch's, Neck's cases 2 and 3, Kausch's two cases, and Hanssen's Case 7). Wichern's second patient suffering from typhoid fever also had a right kyphoscoliosis. In Kausch's Case 2 and Hanssen's Case 9 the tuberculosis of the spine had entailed a more or less pronounced paraplegia, and they can therefore be compared with Bloodgood's Case 4 of paraplegia caused by syphilitic myelitis.

This group comprises highly dissimilar and for the most part complicated cases. The three paraplegic patients are all much reduced by their chronic illness, and if this had not been allied to a nerve trouble, their

right place would have been in Group III. In Hanssen's case, without doubt, the primary cause of the dilatation's commencement lies in the presence of the enormous dorsolumbar scoliosis, which hardly left space for a finger between the xyphoid process and the spine; over this the duodenum rides, and thus opportunity for a kink or compression of the intestine is given. In the other cases it is scarcely reasonable to think that the scoliosis (sometimes right and sometimes left) or an inveterate kyphosis has been the only reason for the dilatation. On the contrary, one may be inclined to doubt whether the spinal disorder has had any influence on the onset of the dilatation at all. For with Kelling's, Kirch's and Neck's (No. 3) patients, all of whom were somewhat delicate but were in ordinary health at the time of the illness' commencement, the dilatation arose in direct connection with a palpable overloading of the stomach. Kelling's patient, who usually ate enormously, had eaten Schöpsenfleisch with beans and two unpeeled pears the third day after fitting a new corset; Kirch's had had three platefuls of bread soup and a glass of Weiss beer; and Neck's patient No. 3, three bowlfuls of buttermilk, when the illness broke out. Of Neck's 40-year-old patient, who had always been well and without digestive or intestinal troubles of any kind, the only factor predisposing for dilatation of the stomach which is mentioned was a stationary dorsal kyphoscoliosis of long standing.

5. A remarkable group is composed of cases in which *the dilatation is attributed to overloading of the stomach.* Under this heading I have included only patients with whom no other explanation is found for their illness, or where other conditions, such as a slight weakness or earlier dyspepsia, are quite insignificant beside the single overloading. Of this sort the collection contains 10 cases: Bastedo's (Nos. 2 and 3), Hanssen-Löberg's, Heine's, Hoffmann's, Houston's, Körte's, Landahl's, Sommarin's, and Wahlström's. But it is doubtful whether several cases from the previously mentioned groups do not by right belong here. As an instance, Kelling's patient is placed by Conner in this category, and Kirch's and Neck's (No. 3) cases probably ought also to have been included.

Some of these patients have been somewhat weakly and others formerly had dyspeptic symptoms now and then, but on the whole the group seems to comprise healthy people in the ordinary sense of the word. Of their earlier health nothing is said in Houston's, Körte's and Bastedo's (No. 2) cases; of Heine's, Landahl's and Bastedo's (No. 3) patients it is remarked that they were in a good state of health, but had now and then had dyspeptic symptoms; Wahlström's patient was delicate, but Hanssen-Löberg's, Sommarin's and Hoffmann's were quite well — the last two accustomed to overfeeding; it is remarked of Hoffmann's patient that he usually had a large appetite and often ate three or four times more than others and without masticating his food: "er schlang vielmehr das Essen hinunter."

Hoffmann's, Landahl's and Hanssen-Löberg's patients came home tired after enervating work; the last named, as well as Körte's patient, ate in haste, and with Bastedo's patient (No. 3), the stomach became suddenly distended by a "very big dose" of tartaric acid and sodium. In the other cases, special circumstances with the overloading were not given, and its nature and degree are in the different cases very varied. In Hanssen-Löberg's, Körte's and Bastedo's (No. 2) cases the dilatation made its appearance immediately after a hearty meal, consisting of six meat cakes and a plateful of soup in the former, of "Mohrrueben" in the second, and in the last-named of ham and cabbage; in Houston's, Landahl's and Sommarin's cases the overloading was caused by raw fruit; Heine's patient had, besides whisky, drunk three or four bottles of champagne. With Hoffmann's gluttonous patient the critical meal was not particularly big, and in Wahlström's case it is only stated that the illness made its appearance "after breakfast."

In 8 of these cases the time between the meal, i. e. the inflating of the abdomen in Bastedo's Case 2, and the commencement of the illness is noted. In both Bastedo's and Hoffmann's cases the disease began at

once; in Heine's and Landahl's it began after 6 to 8 hours; in all these cases in full violence from the beginning. In Wahlström's and Sommarin's cases the malady seems to have begun, but not severely, after the lapse of a few hours and 12 to 16 hours respectively. The illness reached its full intensity two days later in both cases. We have specially accurate particulars of Hanssen-Löberg's patient. He became violently ill an hour after a meal, and was operated 3 or 4 hours later;[1] the stomach was then distended nearly to the pubes.

Six of these 10 patients died. With 3 of them the diagnosis was verified both by operation and post-mortem (Hanssen-Löberg's, Hoffmann's and Körte's), with Sommarin's by operation and Wahlström's post-mortem. It is thus proved that even in the case of a person in good health a severe dilatation can develop after a single more or less considerable overloading of the stomach. Overexertion and earlier digestive troubles seem to be predisposing factors. The quickness with which the stomach has been overfilled plays probably also an important part. We find several typical instances of the same kind from olden days, among these Winge's case (Hanssen's Case 1).

As an appendix to this group, we can include Kayser's Case 1. In this instance it is the quality of the food and not the quantity which is the cause of the dilatation: it appears to have been a meat poisoning.

6. A blow on the abdomen is named as the cause in Appel's and Box and Wallace's cases. Both patients were sent to the hospital with the diagnosis of ileus. The time elapsing between the injury and the commencement of the illness is not mentioned. In both cases dilatation of the stomach was proved both by laparotomy and post-mortem.

7. Confinement is likewise followed by dilatation of the stomach in two cases (Campbell, Thomson and Laffer). The dilatation was noticed in the first hours after birth in both cases, and both ended fatally.

8. Finally we have a last group, *without any explanation for the dilatation*. In two cases (those of W. H. Brown and Wright) the illness commenced with the appearance of ileus in two quite healthy subjects, and without known cause. Schmorl's patient also belongs most reasonably to this category, he having been taken ill, as recorded, after violent laughter.

It must also be mentioned that there sometimes seems to be present an *individual disposition* to acute dilatation of the stomach. Legueu first drew attention to this fact. He noticed such a condition after performing two operations with a long interval on the same man. Later Chavannaz, Payer, and Bloodgood (Case 6) made the same observation. The latter's patient was operated twice with a 6 months interval, and both times for an inguinal hernia. The first operation was performed under ether, the last under local anæsthesia; as far as I know the only case in which dilatation of the stomach has occurred after the use of a local anæsthetic. Such a disposition seems, however, not to exist in every case. My patient No. 2 was readmitted to Diakonhjemmet with rupture of a tubal pregnancy, and was operated two years after the above described operation. The circumstances were similar to those two years ago, excepting that a strict control was kept over the fluid which the patient drank. This time no symptoms of gastric dilatation were noticed.

SYMPTOMS

The chief symptoms are *vomiting*, *abdominal distention*, and *collapse*. Symptoms of secondary rank are pain and tenderness over the distended stomach, insufferable thirst, and scanty urine. The function of the intestine is different in different cases; it may have ceased or be more or less uninfluenced.

The better the patient feels beforehand, the more sharply defined the symptoms of the dilatation of the stomach appear. One therefore sees the illness in its purest form after less serious operations; it becomes most conspicuous, however, after the overloading of the stomach in healthy persons. In a case of medium severity, the dilatation will as a rule first show itself by the patient complaining of pain and distention of the epigastrium together with increasing thirst. He will then begin to vomit without subsequent relief.

[1] The operator's statement.

The vomiting occurs at short intervals, and once commenced, it becomes one of the illness's most prominent features, which Legueu has appropriately compared with the continual emptying of the urinary bladder under an ischuria paradoxa. A distention of the stomach develops rapidly. From the commencement it includes the epigastrium; by degrees it extends downward past the navel, and can perhaps reach to the lower parts of the abdomen. The stomach which was normal at an operation yesterday may to-day have become cyanotic and hyperæmic and occupy the greater part of the abdominal cavity. For,as Riedel says, it is a decided fact that a formerly sound stomach can expand quite down to the pubes in the course of 24 to 48 hours.[1] This can even, as Hanssen-Löberg's case shows, happen after the lapse of a few hours. As a rule the distention is largest in the left side of the abdomen, while the right takes little if any part. This is accounted for by the form an extremely distended stomach assumes. Like a thick tube, its fundus part runs in a curve down toward the left Poupart's ligament; here it bends at an acute angle, and a similar pyloric tube runs nearly along the longitudinal axis of the body upward to the right border of the gastrohepatic omentum.

The general condition of the patient is from the beginning less affected than one would imagine by the constant vomiting, and the thirst and distention of the epigastrium are the chief troubles. Especially is this the case with continual and regular emptying of the stomach. As the days pass, the patient's strength sinks, while the frequency of the pulse increases. At one stroke the whole condition may change. In the course of a few hours the patient can sink into deep collapse, with hollow eyes, shrunken cheeks, cold limbs, and thready and extremely rapid pulse. Sometimes the collapse comes quite suddenly and death occurs in a moment, notwithstanding the fact that the condition hitherto has not been especially disquieting. In severe cases the collapse will occur earlier, and in many of these cases the sudden appearance of collapse is the first phenomenon of the illness (Bastedo, Borchardt, Braun and Seidel, Haberer, and Leonhardt).

Upon examination of the abdomen one will find that it is tender. The tenderness commences in the epigastrium and extends downward with the increasing dilatation of the stomach; it is, however, of greatest intensity during the beginning of the dilatation, while the excessively distended stomach often is less tender or not at all. As a rule, a distention will be noticeable which has reached some size. The outlines of the stomach are in most cases quite distinguishable. There are, however, cases noted where an excessively distended stomach has not had the slightest influence on the shape of the abdomen. In the ordinary course of things, splashing sounds elicited by percussion or shaking of the abdomen will show that one has to deal with a large collection of fluid or gas in a distended intestine. So excessively may the stomach be distended upward also, that succussion sounds are produced by the heartbeats and occur simultaneously with the movements of the heart (Leonhardt's Case 2). Sometimes the outlines of the distended stomach are indicated by a symptom which gives the highly interesting evidence that the stomach is not paralysed, namely, by *visible peristalsis* (Baillet's Case 1, Bäumler, Bloodgood's Case 1, Braun and Seidel's Case 6, Haberer, Heine-Ewald, Herrick, Lehmann and Stewart). If a stomach tube is introduced in a severe case, gas and fluid will be expelled with great force, often quite as a small explosion, and, especially under the first evacuation, in large quantities. If one is in doubt as to the seat of the distention, one will not remain so, as with the emptying or lessening of the contents of the stomach the distended abdomen collapses.

The contents of the stomach are watery, and in the beginning yellowish or greenish; later they become brown or black with the mixture of blood. From the commencement the fluid is odorless, but becomes more and more offensive, and sometimes fetid, or of a sweetish, nauseating smell, in some cases, but scarcely correctly, called feculent. It contains bile as a rule; otherwise the contents are very different. Sometimes it contains little, sometimes a considerable amount, of free

[1] "Gallensteinkrankheit mit und ohne Ikterus," Berlin, 1892.

hydrochloric acid; at other times it is without or with abundant lactic acid. In one of Wichern's cases it contained coli bacilli, streptococci and staphylococci. Its bulk is in most cases considerable. As a general rule a single vomiting does not evacuate much, but as the vomiting continues at intervals all day, the quantity vomited becomes a fair amount. The vomiting is often described as profuse, but whether great or little, only a small part of the contents of the stomach is evacuated. Even immediately after a vomiting the stomach tube will evacuate more than several vomitings, and sometimes the first introduction of the stomach tube has removed many litres; for instance, in Neck's first case, directly after a copious vomiting, 4½ litres, and in Borchardt's case, half a bucketful. It is remarkable how quickly the stomach may refill after emptying. An increased secretion probably takes place in every acutely distended stomach, but in very different degrees. In my first two cases the secretion was not noticeably large, but it is sometimes enormous. Morris considered this the most important point of the condition, and suggested the name "gastrosucorrhœa;" and Zweifel thinks the stomach's copious hypersecretion characterized by the pictorial remark: "Als wollt' es sich nimmer erschöpfen und leeren, als wollte das Meer noch ein Meer gebären." It is remarkable, therefore, that vomiting sometimes fails to appear. This is not even an unusual event; one certainly does not often find the non-appearance of vomiting directly remarked upon as with Box, Chavannaz, Conner, Delagenière, Legueu, and von Herff (Case 2), but there are several cases in which vomiting is not mentioned (Houston, Nicolaysen, von Herff's Case 1, Braun and Seidel's Case 4, Bloodgood's Case 6, and others). More frequent and easier to understand is the observation that vomiting, which has been present earlier in the illness, ceases the last hours before death.

Pain is present as a rule, but is of various severity. It generally confines itself to the epigastrium and umbilical region. In many cases the illness commences with a cry of pain from the patient; sometimes he lies day after day moaning continually. Bull's patient (my Case 3) lay two days and nights, so to say, in one constant scream; my patient No. 2 complained without pause, while the pain in my first case was unnoticeable as compared with the thirst and vomiting. Absolute freedom from pain is comparatively rare. Conner found, in his casuistic review, the presence of pain mentioned in 42 cases; in 35 of these the pain was said to be more or less severe. The absence of pain was noticed in only 7 cases.

Thirst is one of the most constant symptoms, and sometimes it becomes severe beyond description. The patient's craving for something to drink, as for instance in my first case, may be so intense that it is extremely difficult to refuse. And many a surgeon can no doubt say, with Laffer, that the terrible, agonizing thirst which could not be relieved either by saline transfusion, enemata, or by drinking has left the deepest impression on his mind. In connection with the desire for fluid is the decrease of the urine, which can lead to suppression. The quantity of urine is, however, in many cases less influenced by the continual vomiting than one would expect.

The intestinal function seems often to be quite independent of the dilatation of the stomach. It is, as a rule, sedulously noticed in post-operative cases. Flatus and movement of the bowels have often both ceased, and their recommencement is one of the first signs of improvement; but in many cases the dilatation of the stomach is accompanied by diarrhœa. It is of interest to notice that the action of the bowels has been unimpaired, even in several cases where mesenterial compression has been present (Engström, Walzberg, Zade, and Bull). It is thus shown that Braun and Seidel incorrectly consider maintained intestinal function as a proof of free passage through the duodenum.

A rare symptom is *hiccough*. *Cyanosis* is observed by Leonhardt, Mayo Robson, and Templeton, *giddiness* by Bull and Heine, and *syncope* by Bloodgood.

PROGNOSIS

Of 144 cases, 78, or 54.1 per cent died. Conner's statistics from 1907 show a mortality of 72.5 per cent and Laffer's from 1908 63.5

per cent. One can judge from this that the prognosis, with the sharper diagnosis and earlier treatment, has steadily improved in time. For the 80 cases in my grouping from the time subsequent to Conner's statistics, the death rate has decreased to 36.2 per cent; and apart from 8 of these cases, in which dilatation was treated by operation, and all of whom died, the death rate for my remaining 72 cases from the time after 1907 sinks to 26.2 per cent.

We get, however, a truer picture of the significance of the illness by considering the cases which have not been treated, or only medically. Their number is 31; of these 29 died; Bastedo's patient No. 2 was cured with apomorphin, and Häberlin's case, which was not understood to be dilatation of the stomach, by hypodermoclysis. It is seen that many of the authors who have occupied themselves with this subject presume that the literature does not give a correct expression for the prognosis of the illness; as many lighter and cured cases are not included because they are overlooked. One may be allowed to doubt the correctness of this statement. An acute dilatation of the stomach has not much disposition to spontaneous cure. Among other circumstances, the extremely unfavorable influence of fluids and the patient's agonizing thirst are likely to act in the opposite direction. One can form an opinion of the illness's duration from the outline which is given for 21 of the 31 cases medically treated or untreated, of which 29, as before stated, ended fatally. In 2 cases (Conner's and Nicolaysen's) death occurred in 3 and 5 hours, respectively, after the first symptoms of dilatation; in 9 cases, after 1 to 2 days; in 4 cases, after 2 to 3; and in 2 cases, after 4 days. In 4 cases the illness lasted between 6 and 9 days. The illness, in more than half of these cases, thus came to a fatal end in two days, or even shorter time. With those patients whose stomach had been emptied more or less regularly with the tube the duration of the illness was much more variable, and sometimes was quite protracted. In Herrick's Case 2 death occurred on the twelfth day, in Bäumler's very typical case (No. 1) on the thirteenth, and in Kausch's case the sixteenth day after the commencement of the dilatation. On the other hand, several of the patients who were treated with stomach tube died in less than a day. In several cases the dilatation reappeared after the first food or drink, and in some cases it continued for some time even after the severe symptoms had disappeared. The Röntgen examination of Sommarin's patient showed that the stomach, even after the lapse of a month, reached to 3 cm. below the navel.

Pathological anatomy. The stomach is always more or less distended. The distention will sometimes be as in our Case 3, comparatively slight, and show itself principally by the globular shape of the stomach; the latter sometimes extends downward right into the pelvis, very often to the symphysis, under these circumstances, according to Fenger, looking like a huge, bent arm with the elbow near the pelvis.

Between these extremes one finds many variations. The excessively distended wall of the stomach is usually described as quite thin. In Nicolaysen's case the stomach is compared to an inflated pig's bladder, in Leonhardt's and Hanssen-Löberg's cases to a market-balloon, and the contents of the stomach were in the latter case visible through the thin wall. Its color is red or bluish, with lesser distention gray or gray-blue. In the mucous membrane regular extravasations are to be found, and often superficial erosions, which explain why the vomited matter by degrees assumes a hæmorrhagic character.

In Thomson's first case the pylorus was obstructed by a tumor. In Kayser's second and Kausch's first case there was a kinking of the duodenum between the horizontal and descending parts. In the older literature one finds, especially in gall-stone cases, several instances of acute dilatation of the stomach ascribed to occlusion of the upper part of the duodenum by adhesions. When the duodenum is mentioned in the post-mortem accounts it is usually described as being distended. The distention has generally been seen to occupy the upper part of the duodenum, while the lower part seems not to have been inspected. The arterio-mesenteric compression at the duodeno-jejunal junction, which plays so important a part in the discussion of the illness'

etiology, is only mentioned by a few authors: P. A. Albrecht, Bäumler, Bloodgood (2 cases), Binzwanger, Conner, Engström, Finney, Hanssen, Kausch, Lehmann, Leonhardt, Müller (2 cases), Payer, Schmorl, Stieda, Walzberg and Zade. Added to these come 3 cases where arterio-mesenteric compression is noticed during the operation, by Tschudy, Bloodgood and Bull (my Case 3). Baillet, Box and Wallace (cases 2 and 3), Neck, Petit and Wichern have noticed that the dilatation extended to the lower end of the duodenum, but make no mention of a compression by the mesenteric artery. Baillet, Engström, and Wichern saw at the duodeno-jejunal junction a furrow or constriction on the duodenum; Bäumler saw, on the part compressed by the mesentery, a rose-colored stripe on the serosa and corresponding to it a necrosis in the otherwise normal mucous membrane, 1.5 cm. broad, nearly circular, but superficial. The fact that the arterio-mesenteric condition has been mentioned in but comparatively few cases can hardly be taken as evidence that compression at the duodeno-jejunal junction has not oftener been present. One is scarcely mistaken in the surmise that a pathologist who does not in his post-mortem account of a case of acute dilatation of the stomach remark upon such a peculiar and, for the illness, significant fact as the arterio-mesenteric compression, either has not been acquainted with it or has neglected the search for its presence. For the remark, that we find only that for which we are looking, can also be applied to a post-mortem.

About the small intestine the literature contains little. When it is mentioned it is generally described as collapsed and lying in the pelvis. It has sometimes been noted that the mesentery was exactly so long, that the small intestines hung down into the pelvis, and in this way causing that pull on the mesentery and the mesenteric artery which produces the compression of the duodenum between the mesentery and spine. In a group of collected cases and in those above mentioned an increased lordosis was noted, on which the duodenum was thought to ride, thus becoming kinked or compressed.

TREATMENT

The treatment is not the least interesting chapter in this peculiar, and formerly nearly always fatal, illness. In the rapid development therapy has undergone in the last fifty years, restoration to health has taken place in a great number of cases which formerly would have been more or less hopeless. The greatest triumphs are achieved by operative surgery. With the acute dilatation of the stomach, however, this has been obliged to admit defeat; on the other hand, results which can compare with surgery's best have been attained by the simplest means.

Among prophylactic measures, too energetic preoperative evacuations of the intestine are cautioned against, and probably with good reason. The danger herewith is presumed partly to be in the debilitation of the patient, partly in so thorough an emptying of the small intestine that its sinking into the pelvis, with following tightening of the mesentery, is favored. It is of great importance, both after operation and during convalescence, to be extremely careful with food supplies in abundance. This rule, correct both in fact and practice, was earlier upheld by Laache. Of the worth of subcutaneous strychnin injections before laparotomies, which by some surgeons are systematically used, I do not venture to express an opinion.

If the dilatation has first developed, one can hardly hope for results from internal remedies. All those remedies which were suggested in former years, when the illness was first known, have now none but historical interest. Among these are atropin, ezerin, morphia, strychnin and apomorphin. It is doubtful if hormonal, which recently has been tried, is of any greater value. Faradization and cold compresses, which in the sixties and seventies were recommended by Fürstner[1] and Erdmann,[2] are likewise obsolete remedies.

It is certainly true that a subcutaneous injection of apomorphin in Bastedo's Case 2 seems to have produced a life-saving emptying of the stomach, but for the evacuation of the overcharged stomach we have an easier remedy in the stomach tube. An energetic and

[1]Berl. klin. Wchnschr., 1876, 142.
[2]Virchow's Arch., Bd. 43, 289.

continual evacuation by the tube has become the principal resource in a case of acute dilatation of the stomach. And with reason. Nothing is more rational than to unload the overcharged and strongly hypersecerning stomach, and it is obvious that the sooner and oftener this is done the more satisfactory is the result. If the evacuation takes place only after the stomach is distended to the maximum and the patient's strength has sunk in the extreme, the diminution attained, even the momentary total evacuation of the contents of the stomach, will often be in vain. An early and complete emptying are alike desirable. Often, however, this is accomplished with difficulty. The greatly distended stomach is full of gas and fluid, and the latter will, when the patient is lying in bed, mould the thin and yielding stomach to the excavations of the posterior abdominal wall. To bring the tube under the surface of the fluid is, under these circumstances, not always easy. One has to try tubing with the patient lying in different positions. Elevation of the pelvis, for instance, is often necessary to drive the fluid higher up in the abdominal cavity. That one must also insert the tube much deeper than usual is evident. Delagenière, Houston and Lehmann introduced the stomach tube in vain; with Bloodgood's patient its introduction had to be given up on account of the alarming symptoms it caused, and von Herff met with an obstacle in the cardia, which was only overcome by the use of a stiff tube. A correct and consistent tube treatment must, however, be supported in different ways. To this belong reasonable stimulation of the heart and a compensation for the patient's enormous loss of fluid by giving intravenous, subcutaneous, or rectal infusions.

It seems to be a generally accepted view that the treatment with the stomach tube affords sufficient help for curing an acute dilatation of the stomach. This opinion is urged, by Braun and Seidel among others; and Haberer declares that the often serious cases of this illness which in the course of time have occurred in the first surgical clinic in Vienna are all cured, and mostly in this way. Neither he nor Körte have seen an unsatisfactory result in an uncomplicated case of primary post-operative dilatation of the stomach. I have, however, much difficulty in adopting so optimistic a view of the effect of the tube treatment. I am prevented therefrom by the knowledge gained both from the literature and from my own experience.

Of the 48 patients in this summary treated by stomach tube, 24 were cured and 24 died (Table I). The high death rate in a number of cases similarly treated during recent years must arouse a doubt as to the efficacy of the treatment even under favorable circumstances. It is difficult to believe that such severe complications have been present in half the number of cases, or so deficient a use of an otherwise effective measure, that this has altogether failed. There are also among these 24 fatal cases some which go to show that even in an uncomplicated case a satisfactory result is not necessarily attained by an evacuation of the stomach even if it is begun early and continued twice daily. To this class belongs, for instance, von Herff's case (No. 2), where at the post-mortem there was found no other cause for death than the considerable but uncomplicated dilatation of the stomach. Although a post-mortem is wanting, Laffer's second case also seems likely to arouse some doubt as to the absolute efficiency of the stomach tube. This doubt is increased by considering those cases in which the tube was used without result, though change of posture brought instant relief. Among these I must specially mention Walzberg's case and my Case 1. In these cases the emptying commenced 12 and 8 hours, respectively, after the first symptoms of the dilatation; in both cases evacuation was continued, morning and evening, for two days, but with the reverse of improvement, and in both cases change of posture was effective at once. On the whole, we find many cases, described in more or less detail, in which an early tube treatment led to no result. Here, among others, belongs Baillet's patient, operated upon later, and also the same author's two cases which were treated by the stomach tube alone.

Upon consideration of the tube-treated cases collected in Table I, another fact will be noticeable. This is, that the result of a late

TABLE I—CASES TREATED BY STOMACH TUBE

Reference	Sex and Age	Previous Condition	Dilatation, when	Incidental cause	Stomach tube first used, when	Result	Remarks
P. A. Albrecht	F 30	Tuberculosis; Resectio cubiti	4th day		6th day	Died 10th day	Post-mortem: Arterio-mesenteric compression.
Albu	M 26	Scarlet fever	11th day	Gluttonous; appetite had returned	15 hrs. after dilatation	Died 20 hrs. later	Post-mortem: Stomach enormously distended.
Baillet	F	Ovariotomy			Directly after dilatation	Died 8th day after operat.	
	F	Cholecystectomy			Directly after dilatation	Died 8th day after operat.	
Bäumler	F 25	Typhoid fever	5th week	Appetite quickly increased	25 hrs. after dilatation	Died 12 days later	Post-mortem: Arterio-mesenteric compression. Furrow on serosa, circular necrosis of mucosa.
Beck	F 15	Appendectomy	3d day		24 hrs. before dilatation	Cured	
Birnbaum	F 45	Hystero-myomectomy	4th day		6-8 hrs. after dilatation	Cured	Condition seemed hopeless. Unexpected improvement 9th day.
Bloodgood (VI)	M 58	Inguinal hernia; Radical operation	"Very quickly"		Soon after dilatation	Cured	Castor oil was found in the stomach after 12 hrs.
Borchgrevink (V)	M 20	Nephrectomy	2d day		Soon after dilatation	Died 3d day	
Braun and Seidel	F 30	Salpingotomy	3½ days after operat.	Extreme thirst; drank much	36 hrs. after dilatation	Cured	
Braun and Seidel	F 28	Salpingotomy	2½ days after operat.	Patient drank very much	60 hrs. after dilatation	Cured	
Braun and Seidel	M 50	Appendectomy	3 days after operat.	Severe thirst; drank much	4 to 5 hrs. after dilatation	Cured	
Braun and Seidel	M 45	Appendectomy	3 days after operat.	Plenty of wine and water taken	2 to 3 hrs. after dilatation	Cured	Vomiting not mentioned.
Braun and Seidel	F 43	Cholecystotomy	2d day	Ill directly after first solid food	Shortly after dilatation	Cured	
Braun and Seidel	M 12	Urethrotomia externa	4th day		Directly after dilatation	Cured	Gastric peristalsis visible.
P. Bull	M 17	Amputatio cruris	2d day		3d day	Cured	
Engström	F 45	Hystero-myomectomy	4th day	Ill after hearty dinner	24 hrs. after dilatation	Died	Death directly after evacuation. Arterio-mesenteric compression.
O. Hanssen	M 33	Diabetes			8 hrs. after dilatation	Died 12 hrs. later	
Heine	M 34	Good health		Ill after 3 or 4 bottles of champagne, etc.	5 hrs. after dilatation	Cured	At the beginning of dilatation much dizziness.
Heine-Ewald	M 16	Reconvalescence after typhoid fever.		Excess in drinking	25 to 30 hrs. after dilatation	Cured	Gastric peristalsis visible.
Hellendahl	F	Intra-abdominal shortening of round ligaments	3d day		Directly after dilatation	Cured	
v. Herff	F 40	Supravaginal hysterectomy	5th day		Shortly after dilatation	Cured	
v. Herff	F 42	Vaginal hysterectomy	2d day		4th day	Died 8th day	No vomiting. Only a stiff stomach tube could be introduced. Evacuation twice daily.
Herrick	F 55	Cholecystectomy	3d day		?	Died 14th day	
Kausch	F 13	Spondylitic paraplegia	Ill the day after introduction of weight extension		24 hrs. after dilatation	Died 15 days later	Post-mortem: Arterio-mesenteric compression ceased by lifting of the uppermost jejunal coil.

TABLE I (CONTINUED)—CASES TREATED BY STOMACH TUBE

Reference	Sex and Age	Previous Condition	Dilatation, when	Incidental cause	Stomach tube first used, when	Result	Remarks
Kayser	F 37	Intestinal anastomosis, etc.	7th day	Ill after having drunk a quantity of buttermilk	Shortly after the dilatation	Died 8th day	Post-mortem: Enormously distended stomach. Duodenum kinked below the liver.
Kirch	M 19	Delicate; kyphoscoliotic		Ill directly after supper of 3 platefuls of bread soup	4 days after dilatation	Died 24 hrs. later	Exploratory aspiration of the stomach.
Laffer	M 17	Empyema of antrum of Highmore drained	13th day	Had lately taken a large amount of milk and water	Directly after dilatation	Died 16th day	Stomach tube used regularly twice daily until death.
Laffer	M 38	Appendicitis operation	24 hrs. later			Cured	
Laffer	M 36	Paraplegia syphilitica			The day after the dilatation	Died 24 hrs. after dilatation	Post-mortem: Gastric but not duodenal dilatation.
Landahl	M 13	Good health		After exertion plenty of water and raw fruit	45 hrs. after dilatation	Died 15 hrs. later	
Legueu	F 30	Nephrectomy	3d day		7 hrs. after dilatation	Died 6th day	No vomiting.
Leonhardt	M 30	Pneumonia	16th day		4 days after dilatation	Cured	By stomach tube, enormous quantitites evacuated.
Leonhardt	M 29	Pneumonia	9th day		2 days after dilatation	Died 12th day	Splashing sounds coincident with the movements of the heart.
P. Müller	F 64	Cholecystotomy	2d day		1 day after dilatation	Cured	Stomach distended toward pubes.
Neck	M 16	Rather delicate		Ill after having eaten much raw fruit	5 days after dilatation	Cured	Directly after copious vomiting, 4½ litres evacuated by stomach tube.
Neck	F 40	Kyphoscoliotic, but healthy		The dilatation was unexplainable	8 days after dilatation	Cured	First evacuation gave 2 litres.
Neck	M 42	Tuberculous; kyphoscoliotic	Shortly after supper	Two platefuls of buttermilk for supper	3 days after dilatation	Died 5 hrs. later	Exploratory aspiration. First evacuation gave 3 litres.
Neck	M	Tuberculosis		After dose of veronal		Cured	
Payer	F 33	Nephrectomy	6th day	Ill after an orange	7th day	Died 8th day	Post-mortem: Arterio-mesenteric compression.
Robson (V)	F	Cholecystotomy	7th day		1 to 2 days after dilatation	Cured	Collapse; cyanosis; anuria.
Robson (VI)	F 29	Hysterectomy	14th day	Ill after a raw apple	2 days after dilatation	Cured	Stomach distended to the pubes.
Schilling	F 40	Hysterectomy	2d day		Shortly after dilatation	Cured	Condition for 8 days seemingly hopeless, then sudden improvement.
Thomä	F 34	Tubal pregnancy; laparotomy	3d day		4 to 6 hrs. after dilatation	Cured	5th day, new dilatation after fluid.
Thomson	F 32	Confinement	6 hrs. after delivery		Directly after dilatation	Died 6 hrs. later	
Walzberg	F 27	Hepatic abscess drained	2d day		15 hrs. after dilatation	Died 8th day	Post-mortem: Gastro-duodenal dilatation; arterio-mesenteric compression.
Wichern	F 27	Typhoid fever	21st day		20 hrs. after dilatation	Died 23d day	Post-mortem: No furrow on duodenum as in Wichern's first case.
Zade	F 32	Gastro-enterostomy	3d day		8 hrs. after dilatation	Died 2 hrs. later	Post-mortem: Arterio-mesenteric compression; excessive dilatation.

commenced tube treatment is not always as bad as might be expected. Braun and Seidel's Case 2, Leonhardt's Case 1, and Neck's cases 1 and 2, in which treatment by the tube seems to have commenced about 60 hours (4, 5 and 8 days, respectively) after the first symptoms of dilatation, are instances of this kind ending favorably. Kelling's case, so accurately observed and described, also belongs to this class, inasmuch as restoration to health must rather be ascribed to the gastric lavage than to the change of position. The evacuation commenced, as the author explicitly states, 3½ days after the onset of the dilatation. The impression which these observations leave is that the effect of the evacuation of the stomach not only depends upon early, continual and complete execution, which are a matter of course with every sort of treatment. On the contrary, it seems reasonable to suppose that special anatomical or functional conditions may be present or have reached such a development that they destroy the effect of the tubing in one case, but not in others. And one asks involuntarily if it may not be the duodenal occlusion, to which under the etiology we again and again return, which, once developed either alone or in connection with gastric hypersecretion, annuls the results of the stomach tube treatment in some cases.

In former days one felt obliged to operate the patient when the treatment with the stomach tube proved inefficacious. If we look at the results attained by operative treatment for acute dilatation of the stomach, we meet with no encouragement.

There are 4 groups of operations: in 5 cases, gastro-jejunostomy, partly with anterior and partly with posterior anastomosis, and in 11 cases, gastrotomy or gastrostomy. Jejunostomy has been performed once, and a last group comprises 6 cases treated by laparotomy, with or without evacuation of the non-incised stomach, or with undoing of a duodenal compression. To this last group Borchardt's and Bull's patients (my Case 3) properly belong. On account of the postural treatment instituted after the operation, however, these two cases are recorded among those treated by change of position (Table III).

The cases treated by gastro-enterostomy are Baillet's, Körte's, Remond's, Robinson's, and Tschudy's. Among these, the dilatation in Baillet's and Tschudy's cases was post-operative, after exarticulation of the arm and resection of the pylorus; in Körte's case it developed after overloading of the stomach in a formerly healthy individual. In the other cases, there is no information as to the origin of the dilatation. Of all of them, Robinson's patient is the only one who lived; the other 4 are dead. Baillet's patient died 12 hours after the gastro-enterostomy; Körte's, after 5 days' promising convalescence and as a result of a perforated necrotic spot in the stomach; Tschudy's patient survived the last operation 11 days, dying of pneumonia. The accompanying circumstances give a certain explanation for the different results. Both Körte's and Tschudy's patients were operated upon shortly after the onset of the dilatation, while in the case of Baillet's patient the dilatation had lasted 4 days before gastro-enterostomy took place. Bloodgood's patient, who was reconvalescent after acute rheumatism and in whom dilatation was presumably caused by overloading of the stomach, died two hours after the jejunostomy.

Gastrostomy was performed on Appel's, Abbott's, Box and Wallace's, Brown's, Hoffmann's, Hanssen-Löberg's, Kehr's, Schilling's, Sommarin's, and Watson and Wright's patients. Of these, Appel's and Box and Wallace's patients had acquired the dilatation after a blow on the abdomen; Hanssen-Löberg's and Sommarin's patients, after a more or less hearty meal; Kehr's and Schilling's, after gall-stone operation and gastro-enterostomy, respectively, and with Brown's patient, who up to the acute dilatation of the stomach had been quite well, no cause for the development of the illness could be traced. Appel, Box and Wallace, and Löberg incised, emptied, and closed the stomach and the abdominal wound. Hoffmann, Sommarin, and Schilling left a drainage tube in the incision of the stomach; the latter led the tube farther through the gastro-jejunal anastomosis, which was established before the onset of the acute gastric dilatation, and Brown stitched the edges of the incision in the stomach to those

TABLE II.—CASES TREATED BY OPERATION

Reference	Sex and Age	Previous Condition	Incidental cause	Operation	Result	Remarks
Abbott				Gastrotomy	Death	
Appel		Of good health	Abdominal injury		Died 36 hours later	The stomach was incised, emptied and closed. Second night, new dilatation; shortly afterwards, death.
Baillet	M 15	Exarticulatio humeri	3d day, suddenly ill after café au lait	7th day gastro-jejunostomy	Died 12 hours later	Gastric peristalsis. Despite regular evacuation with stomach tube, progressive deterioration. Circular furrow on the duodenum.
Bloodgood	M 25	Reconvalescent after acute rheumatism	Ill after first real meal	Jejunostomy 4th day	Died 2 hours later	Gastric peristalsis. Arterio-mesenteric compression.
Box and Wallace	M 16	Of good health	Abdominal injury	Gastrotomy	Death	Laparotomy for intestinal obstruction. The stomach was incised, emptied and closed.
W. H. Brown	M 55	Of good health	Dilatation unexplainable	Gastrotomy	Death	Laparotomy for intestinal obstruction showed a "cyst," which was incised and drained. Post-mortem: the incised cyst proved to be the stomach.
B. Robinson				Gastro-jejunostomy	Cured	"B. R. has reported a cure after gastro-jejunostomy" (Laffer).
Hochenegg	M 22	Of good health	Suddenly ill after hearty meal	Laparotomy 3d day	Died 2 days later	The jejunum was lifted and the compressed duodenum relieved. After short relief new vomiting. Arterio-mesenteric compression.
Hoffmann	M 18	Of good health	Severely ill directly after dinner	Gastrostomy 6th day	Died 24 hours later	The stomach was incised, emptied, and drained.
Jessop	F 26	Hip-joint resection	30th day, suddenly ill after having eaten an apple	Laparotomy 34th day	Died few hours later	The operation was only explorative.
Kehr		Gallstone operation		Gastrostomy	Death	Died 2 days later from hæmorrhage.
Körte	F 14	In good health	Ill after big meal eaten in haste	Posterior gastro-enterostomy	Died 5th day	Evacuation by stomach tube proved impossible. For 3 days quite well. Sudden death from perforating gastric necrosis.
Hanssen-Löberg	M 15	Good health	Ill one hour after big meal eaten in haste after exertion	Gastrostomy 3 to 4 hrs. later	Died the next day	Two evacuations by stomach tube. The stomach was then incised, emptied, and closed. Death after short relief. Excessive dilatation.
Moorhead	F 22	Perineorrhaphy, oöphorectomy, appendectomy		Laparotomy. Stomach emptied by tube	Cured	After the perineorrhaphy a large tumor suddenly formed in the abdominal cavity. Laparotomy. The tumor proved to be the distended stomach, which was emptied by tube.
Petit				Laparotomy	Cured	A kinking at the duodeno-jejunal junction was relieved by the stitching of jejunum to transverse mesocolon.
Remond				Anterior gastro-jejunostomy	Death	
Schilling	F 25	Posterior gastro-enterostomy		3d day, jejunal anastomosis; 8th day, gastrostomy	Died 16th day	After the gastrostomy a drain was led through the gastro-jejunal anastomosis into the jejunum.
Sommarin	F 15	Good health	Excessive amount of raw fruit. Next day 3 bottles of mineral water	Witzel's gastrostomy 2d day of illness	Cured	
Templeton	F 28	Dyspeptic, otherwise healthy	Ill after a railway meal	Laparotomy	Cured	The greatly distended stomach emptied itself during the operation without being incised or pumped.
Tschudy	F 47	Kocher's pylorectomy		Gastro-jejunostomy	Died 16th day	Continual post-operative vomiting. Fifth day, gastro-jejunostomy. No later gastric symptoms. Death from pneumonia.
Wahlström	M 17	Delicate	Suddenly ill after breakfast	Laparotomy 5th day	Died 10th day	The exposed stomach was emptied by trocar. After the operation, regular use of stomach tube.
Watson				Gastrostomy	Died	
Wright				Gastrostomy	Died	

of the abdominal wound. Appel's patient died some 36 hours after the operation, under repeated dilatation, Brown's died 5 hours and Hoffmann's one day after the gastrostomy. Schilling's patient lived 8 days after the last operation under continual evacuation of the stomach with the tube. Sommarin's patient is the only one who was cured.

The 6 cases treated with laparotomy and without incision of the stomach underwent otherwise a different treatment. Jessop seems to have performed only an exploratory laparotomy, which a few hours later was followed by death. While the abdominal cavity was open, Moorhead (as also Borchhardt) emptied the stomach with a tube, Wahlström with trocar. Moorhead's patient recovered under continued treatment with the stomach tube; Wahlström's died after the lapse of 5 hours. Templeton lifted the stomach, the contents of which therewith spontaneously went over into the intestine; his patient recovered. Hochenegg relieved the duodeno-jejunal occlusion by lifting the upper jejunal loop, and seems to have confined himself thereto; his patient died 2 days after the operation under renewed dilatation and vomiting; Petit performed the same maneuver, but stitched the jejunum to the transverse mesocolon, and this seems to have prevented a new occlusion; the patient recovered. The satisfactory result in Moorhead's case is the more easily explainable in that the laparotomy which was performed took place under the same narcosis as that which is presumed to have occasioned the dilatation. Templeton's patient seems also to have come early under treatment. On the other hand, Hochenegg's, Jessop's and Wahlström's fatally ending cases, all similar in so far as dilatation seems to have been occasioned by food, are operated first on the third, fourth, and fifth day of illness.

We thus see that of 23 operated cases 5 survived, 1 after gastro-enterostomy, 1 after gastrostomy, and 3 whose stomachs were emptied during a laparotomy. Even if the operative result in Körte's and Tschudy's cases is considered satisfactory, gastro-enterostomy does not appear in any flattering light. It seems reasonable to agree with Borchardt, who declares such an operation irrational. In the commencement of the illness, while gastro-enterostomy could have a chance, one can attain a good result with simpler measures; and at a later stage of the illness, the difficult manipulation of the perhaps excessively distended stomach makes gastro-enterostomy a too serious operation for the collapsed patient. As Zade's, Schilling's and von Haberer's cases show, an acute dilatation of the stomach can both develop and continue notwithstanding an already performed gastro-enterostomy. Gastrostomy, which one would consider much less dangerous, has in the 11 cases collected here given even worse results than gastro-enterostomy. Lastly, as regards the performed laparotomies, they have, as might be expected, been somewhat more successful than the more radical operations. They have, however, proved themselves both unnecessary and dangerous. The stomach can be emptied without laparotomy. The conclusion one comes to upon considering the result of all the operations performed is that success with operative measures, in a still higher degree than with any other treatment, depends on the stage of the illness in which the operation takes place.

After the discouraging experience gained one can foresee that operative treatment of the acute dilatation of the stomach in the future will rarely be employed. Byron Robinson's suggestion of a duodeno-jejunal anastomosis in front of the mesenteric vessels and H. Albrecht's and Rosenthal's proposal of shutting off the pelvis by uniting the sigmoid flexure with the urinary bladder are hardly more suited to rehabilitate operative measures in the acute gastric dilatation than the recommendation of stitching the root of the mesentery to the transverse colon.

If we turn from operation to the treatment of acute dilatation of the stomach by postural treatment, things take at once a brighter outlook. First we meet with 26 cases in which the patient is turned completely over in bed. Among these is also included Box's patient, who was laid "semi-prone," on the right side. Of the others, the 23 have chiefly lain in Schnitzler's abdominal position; only 2, Engström's and Weinbrenner's, patients were laid in knee-chest and knee-elbow posi-

tion, respectively, which positions are suggested by Albrecht for the elevation of the pelvis.

The results are as follows: Of 26 treated patients, 2 are dead, Borchardt's and Nakahara's. With the first the abdominal posture proved unfavorable, in the last it seems to have been effective.

The first, a female aged 17, was quite well until 52 hours after a nephropexy, almost as if she had not been operated. Then she collapsed suddenly. A small explorative laparotomy was performed, which showed an enormous dilatation of the stomach. With the stomach tube ½ bucketful of fluid mixed with bile was emptied. The next morning the patient was somewhat better and was laid prone in bed, but after this she became "foudroyant" worse and died a few hours later, 23 hours after the first symptoms of dilatation and 75 hours after the nephropexy. Post-mortem the stomach was found distended right to the symphysis.

With Nakahara's patient, a female aged 29, hepatico-jejunostomy was performed June 10, 1908. June 11, severe vomiting of greenish fluid after evacuation of the stomach and subcutaneous and rectal saline infusion. The patient was laid partly on the abdomen, and partly on the right side. June 12, condition considerably better. June 13, patient felt well, and drank milk and soup. All was now well until June 19, when the patient suddenly collapsed, bile and intestinal contents escaping through the wound. The patient died June 25. Post-mortem the stomach showed only slight dilatation. The suture line between the hepatic duct and the jejunum had given way, and besides an aneurysm of the hepatic artery had burst into the anastomotic aperture and filled the upper part of the small intestine with blood.

In two cured cases, Hellendahl's and Kayser's, the abdominal position was without result. In the first of these cases it was abandoned after a short while on account of pain, and was tried the next day for only half an hour; three days later the gastric symptoms spontaneously ceased. The other case seems to have been a dilatation of the stomach occasioned by meat-poisoning, where nine days elapsed without effect from any measure tried—stomach tube, various positions, etc. But when, on the tenth day, the patient was moved to another division, she became suddenly well for no known reason. A likewise sudden and unexplainable improvement was noted with Schilling's tube-treated patient after eight days in a dangerous condition.

In the other 22 cases, the abdominal posture has oftener, in the presence of threatening symptoms, and partly when longer treatment by the stomach tube had been without result, brought about a noticeable, often a surprising, effect, and occasioned the beginning of return to health (see Table III).

Of the 6 patients treated by side posture, one, Nakahara's is dead, the other 5 are cured. Chavannaz's, Payer's and Walzberg's patients were laid on the right and Kelling's on the left side; on which side Nakahara's and Herrick's patients were placed is not mentioned. In Nakahara's fatal case side posture was tried only for a short time; in Herrick's and Kelling's cases, which recovered, it did not, at any rate, have a decided effect; in the 3 cases laid on the right side, however, the effect was satisfactory, in Walzberg's case even excellent, and as prompt as the abdominal position can produce it.

It will thus be seen that the abdominal posture in 22 of 26 cases has proved efficacious; in one case (Borchardt's) it seems to have done harm, and in 2 cases (Hellendahl's and Kayser's) to have been without effect. Both the last named, however, are not typical cases of dilatation of the stomach, and thus can hardly be used as a basis for judging the value of the abdominal posture for the treatment. The effect of the side posture has been scarcely noticeable in 4 out of 6 cases; position on the right side has in 3 cases proved very satisfactory (see Table IV).

By the perusal of the history of the recorded cases one will find, however, that the favorable result of the abdominal posture in a case of acute gastric dilatation does not belong to the common round. It is, of course, not always alike conspicuous, but on the other hand the immediate result of the change of position has astonished one observer after another, and Weinbrenner's, Rosenthal's, H. Albrecht's and Landau's description of the equally complete and rapid change in the condition of the patient from the moment he was placed on the abdomen proves beyond doubt that one under these circumstances can meet with an effect which is most unusual. And so it is. In my second and third cases the abdominal posture was adopted rather

TABLE III.—CASES TREATED BY ABDOMINAL POSTURE

Reference	Sex and Age	Previous condition	Dilatation when?	Stomach tube first used	Abdom. posture when?	Result	Published	Remarks
Schnitzler		Operat. for inguinal hernia	1st day		3d day	Cured	1895	Serious condition. In abdom. posture, relief.
P. Müller	F 32	Cholecystectomy	1st day	2d day	3d day	Cured	1900	In abdom. posture, immediate and total change, despite much fluid. On the back new vomiting. Patient is comfortable in abdom. posture.
Bäumler	M 36	Sciatica		1 day after dilatation	1½ days after dilatation	Cured	1901	Knee-elbow position ¼ hour every other hour; meanwhile abdom. posture as much as possible. The vomiting stopped at once. By new tubing stomach proved empty. Quick recovery.
Box	F 27	Ovariotomy	3d day	3d day	4th day	Cured	1903	Patent was placed "semi-prone" on the right side. The effect was apparent at once.
Borchardt	F 17	Nephropexy	52 hrs. after operation	Directly after dilatation	1 day after dilatation	Died	1904	Stomach tube inserted during exploratative laparotomy 53 hrs. after the nephropexy. In abdominal posture next day patient got "foudroyant" worse and died few hours later.
Robson	F 58	Ovariotomy	20 hrs. later		25 hrs. after operation	Cured	1904	In abdom. posture, patient declared herself relieved almost immediately.
H. Albrecht	F 37	Colporrhaphy; ovariotomy	3¼ days later	Directly after dilatation	Shortly after dilatation	Cured	1907	Suddenly ill after excess in fluids. Result of abdominal posture prompt and surprising. Patient maintained it with pleasure.
Kayser	F 20	Meat poisoning	4 hrs. after the meal	4 to 5 hrs. after dilatation	5th day after dilatation	Cured	1908	Stomach tube and different changes of posture (abdominal, knee-chest, elevated pelvis) without effect. Tenth day of illness patient was moved to another division. Sudden improvement.
Landau	F 38	Hystero-myomectomy	3d day	3d day	6th day	Cured	1908	In abdom. posture instantaneous and in the highest degree surprising change of general condition. Sudden relief and "acute recovery" from an apparently hopeless state.
Landau	F					Cured	1908	Cured by abdominal posture alike quickly as previous case.
Lichtenstein	F 43	Laparotomy etc.	9th day	10th day	10th day	Cured	1908	Suddenly ill after a bottle of Apollinaris. In abdominal posture, relieved at once, but feeble. Next day well.
Nakahara	F 29	Hepatico-jejunostomy	1st day	2d day	2d day	Died	1908	In abdom. posture all went well till 9th day. Then intestinal hæmorrhage and fistula. Death 15th day.
Rosenthal	F 37	Hystero-myomectomy	3d day	4th day	5th day	Cured	1908	Suddenly and severely ill after 3¾ litres coffee. Most striking effect of abdominal posture. "It seems incredible that an illness in 1 hour can improve so."
Baillet	F 30	Ovariotomy	2d day	5th day	8th day	Cured	1909	In abdominal posture quick recovery from a menacing condition.
Delagenière	M 62	Herniotomy	16 hrs. later	Failed	24 hrs. after operation	Cured	1909	The utterly exhausted patient feels very comfortable in abdominal posture and improves hourly. After lying prone the whole night his aspect is completely changed.
Engström	F 69	Ovariotomy	3¼ days later	5th day	5th day	Cured	1909	Ill after heavy supper. For 10 minutes placed on knees and chest with instantaneous relief, then on the right side.
Haberer	F	Gastro-enterostomy	13th day	13th day	13th day	Cured	1909	Gastric lavage without effect; such was at once produced by abdominal posture.
Theilhaber	F 33	Sectio Cæsarea	3d day	3d day	5¼ days after operation	Cured	1909	The violent vomiting stopped promptly in abdominal posture. Patient improved hourly, remained prone for 16 hours and liked the position.

TABLE III (CONTINUED).—CASES TREATED BY ABDOMINAL POSTURE

Reference	Sex and Age	Previous condition	Dilatation when?	Stomach tube first used	Abdom. posture when?	Result	Published	Remarks
Weinbrenner	F 37	Ventrofixatio uteri	1st day	12 hrs. after dilatation	36 hrs. after dilatation	Cured	1909	In a state of impending danger abdominal posture gave instant relief and gradual improvement. Patient insisted upon remaining prone; she felt well thus.
Hellendahl	F 24	Salpingotomy		Directly after dilatation		Cured	1910	Patient could not endure abdominal posture. It was again tried for ½ hour the next day.
Payer	F 23	Hysterectomy after birth	4th day	4th day	5th day	Cured	1910	Patient was quickly relieved by abdominal posture alternating with knee-chest position.
Borchgrevink	F 53	Cholecystectomy	3d day	8 hrs. after dilatation	2½ days after dilatation	Cured	1912	Ill after much fluid. Gastric lavage twice daily for 2 days without effect. Patient, who appeared to be dying, improved as by a miracle in abdominal posture.
Borchgrevink	F 27	Salpingotomy	2d day	24 hrs. after dilatation	30 hrs. after dilatation	Cured	1912	Ill after much fluid. The severe pain and vomiting were at once relieved by abdominal posture, which the patient wished to continue.
Borchgrevink	M 43	Laparotomy	2d day	12 hrs. after dilatation	36 hrs. after dilatation	Died	1912	The symptoms of acute gastric dilatation vanished promptly in abdominal posture. Patient was well for 15 days, when he was taken ill, and died 7 days later from pneumonia.
Borchgrevink	M 9	Appendicitis operations	19th day	Not used	60 hrs. after dilatation	Cured	1912	Laparotomy without effect; 12 hrs. later prone posture brought immediate relief. Patient, for 2 days nearly wild from pain, became quiet and happy.
Borchgrevink	M 65	Cholecystitis, not operated	Shortly after the first food taken	Not used	14 hrs. after dilatation	Cured	1912	Abdominal posture had a striking effect.

early. Both patients were certainly in a serious condition, but the illness had not reached an extreme degree. The effect of the prone position was in both cases prompt and striking. My first patient, on the other hand, who was placed in abdominal posture about 60 hours after the onset of the dilatation, and at a moment when she seemed to be past recovery, was cured in the most dramatic manner. The same was experienced in my case No. IV, treated by Dr. Bull. I have often wondered whether I have ever witnessed a sudden and continued therapeutic effect which can compare with that which the abdominal posture brought about in my first case. But to this I have always had to reply in the negative. According to my experience, even Landau's comparison with the effect of the reduction of a strangulated hernia is insufficient. Herein I imagine everyone who has witnessed the effect of the abdominal posture in a desperate case of acute dilatation of the stomach will agree. When Braun and Seidel write thus: "Von der Bauch oder Knie-Ellenbogenlage möchten wir meist nicht viel erwarten," it only proves their non-experience of such an event. The unsatisfactory effect of the abdominal position in Borchardt's case, the author himself, in contrast to others, considers of no importance, but finds the result explained by too late diagnosis. In Bull's first case, in nearly every respect a parallel to Borchardt's, change to a prone position had an effect as striking as ever.

ETIOLOGY

Although my article was originally intended only to comprise the treatment, I cannot neglect to mention the greatly discussed etiology of the acute gastric dilatation. The observation of the instantaneous effect of the abdominal posture, which has much of the character of an experiment, compels one involuntarily to a consideration of the etiological question based on personal experiences, and to the study of the literature on the topic. It appears to me that a functional disturbance like acute dilatation of the stomach is better explained

TABLE IV.—CASES TREATED BY SIDE POSTURE

Reference	Sex and Age	Previous condition	Dilatation when?	Stomach tube first used	Side posture first tried	Result	Published	Remarks
Kelling	F 16	Plaster jacket applied	3 days later	3¼ days after dilatation	3¼ days after dilatation	Cured	1900	Ill 6 hours after big dinner. Placed on the *left* side. Improvement under continued gastric lavage.
Walzberg	F 43	Explorative Laparotomy	36 hours later	12 hours after dilatation	60 hours after dilatation	Cured	1902	Despite gastric lavage twice daily, patient grew worse and worse. Effect of right side posture prompt and complete.
Herrick	M 36	Pneumonia	9th day	1 day after dilatation	1 day after dilatation	Cured	1904	Which side posture not mentioned. Gradual improvement under gastric lavage thrice daily for 4 to 5 days.
Chavannaz	F 40	Abdominal Hysterectomy	9th day	12 hours after dilatation	15 hours after dilatation	Cured	1905	Right side posture put an end to the vomiting.
Nakahara	F 21	Excision of tetanus ulcer	16th day	18th day	17th day	Died 18th day	1908	"Side posture" difficult to maintain and without effect. Next day sudden death during the first gastric lavage.
Payer	M 4	Appendicitis operation	2d day		Directly after dilatation	Cured	1910	The disposition to dilatation ceased only after the removal of the abdominal drain.

by clinical observations than by the numerous experiments on animals and studies on corpses.

The principal hypotheses to explain the development of the acute dilatation of the stomach are the following:

1. *Paralysis of the stomach.* This is the oldest and most generally accepted explanation. It is first asserted by Brinton[1] in 1859 and later maintained up to this time, and last with great emphasis, by Braun and Seidel in their clinical and experimental investigations from 1907.

2. *Primary mechanical occlusion of the duodenum with secondary dilatation of the stomach.* The compression of the duodenum under the mesentery was described by Kundrat [2] as a special form of high strangulation, and its significance as a primary cause supported by P. Müller.

3. *Primary gastric dilatation, be it by neuro- or musculo-paresis, and secondary mechanical occlusion of the duodenum, either* (*a*) by the distended stomach's direct pressure on the duodenum in its passage over the spine (Box and Wallace) or (*b*) by a secondary arterio-mesenteric compression brought about by the distended stomach's pressure on the small intestine.[3]

Several other hypotheses have besides been suggested, which have met with less favor. Albrecht, Glenard and Robinson have considered a *pre-existing chronic dilatation of the stomach* to be the primary factor. Fagge and later Morris saw in *gastric hypersecretion*, and Pepper and Stengelin a *spastic occlusion of pylorus*, the determining cause; while Kelling suggested that a *simultaneous valvular kinking of the pylorus and cardia* forms the origin of the dilatation. The existence of a pyloric occlusion is disproved, however, by the presence of bile in the vomited matter, as well as by the fact that post-mortem a nearly constant distention of the duodenum is found; a cardial occlusion is also disproved by the fact that vomiting occurs in most cases. For the formation of a cardial valve there is no other clinical support than von Herff's observation aforementioned.

The view that the whole illness depends upon paralysis of the stomach is supported by the analogy we have in the paralyzed intestine in peritonitis. It has besides found much support in a number of experimental results. Among these, most weight has been laid on the following facts. Section of both the pneumogastric nerves in the dog leads as the only factor to a considerable dilatation of the stomach (Carion and Hallion); the animals lose thereby their capability for reflex vomiting, while the direct influence of apomorphin on the vomiting center is still undiminished. The power of vomiting disappears altogether

[1] Brinton: Lectures on diseases of the stomach.

[2] Kundrat: Wien. med. Wchnschr., 1891, no. 8.

[3] Kayser asserts, supported by his second case, that the secondary occlusion of the duodenum does not take place in its lower but in the upper part. A duodenal kinking in Kausch's first case also had its seat in the same place.

by division of the spinal cord above the sixth dorsal vertebra (Braun and Seidel). An analogy with some conditions in the acute dilatation of the stomach in mankind is presumed to have been found in the following observation of Kelling and Braun and Seidel. With dogs who have got better after gastrotomy, retching and vomiting prevent dilatation of the stomach as a result of overloading; under narcosis, however, one can distend the dog's stomach to the utmost without vomiting occurring. The fact that the dog upon awaking from the narcosis invariably empties its stomach by vomiting, seems to prove that the result of these experiments cannot be brought to bear on the post-operative dilatation of the stomach in the human being.

Among clinical conditions which have been taken as evidence in favor of the paralysis theory is the appearance of the gastric dilatation in connection with disorders of the spine, illnesses of the nervous system, and severe injuries, but above all its dependence on the paralyzing influence of narcosis. The supporters of the paralysis hypothesis consider the mechanical moments of no importance, and look upon the arterio-mesenteric compression as an accidental find and an unessential result of the pressure of the paralyzed and distended stomach (Braun and Seidel).

The arterio-mesenteric compression was by others taken as an equally plausible explanation of the extraordinary dilatation of the stomach, as any intestinal obstruction makes for the distention of the intestine above it. The oftener the compression under the mesentery was observed, the more attention was paid to it, all the more so since those who at the post-mortem sought for it in most cases found it, pointing to a frequency in occurrence which seemed to exclude the possibility of anything accidental.

Attention has later been drawn by von Haberer [1] and Ekehorn [2] to a chronic dilatation of the stomach and duodenum as a result of mesenteric occlusion at the duodenojejunal junction caused by traction on the mesentery from intestinal adhesions. Finally the mechanical theory won much support by the striking and often more or less instantaneous influence of the abdominal posture.

It was already clear to the first advocates of the mechanical hypothesis that the essential condition for the arterio-mesenteric compression lies in a sufficiently strong pull downward on the mesentery of the small intestine. This traction could be executed by the small intestine lying in the pelvis. To get there the intestine must be empty, and in order to perform the pulling it must have (a fact to which P. Müller first called attention) a fairly long mesentery — long enough to permit the bowel to reach down into the pelvis, but not so long that the bowel may rest on the pelvic floor. Glenard drew attention to the fact that the weight of the empty small intestine was about 500 gr., and by numerous experiments on cadavers, Albrecht, Glenard,[3] Conner and others have shown that such a weight on the mesentery, at any rate in many cases, occasions a considerable arterio-mesenteric compression of the duodenum. Glenard states, on the other hand, that this compression is to a certain extent physiological and is present especially after meals, and that the dragging in the living individual need not be very considerable to bring about the occlusion of the duodenum. There is, however, another question to be answered. Why does the small intestine collapse, and why does it sink down in the pelvis to exercise the primary arterio-mesenteric tightening in Kundrat-Albrecht's meaning? On this point, Albrecht, the theory's chief champion, has no answer. He presumes that earlier there probably has existed an ectasy of the stomach, and it will thus "durch eine akute Steigerung der Dilatation, eine rasche Füllung des erweiterten Magens, nämentlich auch durch eine Aenderung der Lagerung des ganzen Körpers — passive Rückenlage, daher das plötzliche Einsetzen des Ileus nach Narcose und Operation — zu Herabsinken des unteren Teiles des Magens ins Becken kommen;" he is, as will be seen, tempted to resort to gastric dilatation as the determining factor, but as this is impossible without the theory

[1] Loc. cit. among collected references.

[2] Ekehorn, Fall von enormer Dilatation des Magens und Duodenums von angeborenem arteriomesenterialem Ursprung. Nord. med. Arch., 1904.

[3] Glenard: De l'Entéroptose. La Presse méd. belge, 1889; cit. after Conner.

being done away with, his argumentation lacks conviction. Rosenthal sees in the fact that the dilatation often develops so long after the operation that the chloroform or ether have long vanished from the system, an evidence against a primary paralysis due to narcosis, and for the supposition that the mechanical condition must be the primary cause of the gastric dilatation. As arguments to the same end, Landau mentions absence of gastric symptoms before the onset of acute ileus, and the incongruity of the effect of the abdominal posture when the stomach is paralyzed. However, both the arterio-mesenteric compression and the dilatation of the stomach are, as von Haberer remarks, anatomically founded facts, and there are many who doubt as little the existence of a primary duodenal obstruction with secondary gastric distention, as the occurrence of a primary dilatation of the stomach with occlusion of the duodenum as an eventual sequel. Among these, H. Albrecht, Beck, Bloodgood, Conner, von Haberer, Kausch and Weinbrenner may be mentioned.

It is of course impossible to prove that a duodenal occlusion in a single instance cannot be the primary cause of gastric dilatation. But it appears that such a supposition is not very probable. Among other things, an obstruction of the duodenum, with which we now and then meet, does not either anatomically or symptomatically create any parallel to the acute dilatation of the stomach. We are acquainted with many cases of acute duodenal obstruction where, for instance, one or more gall-stones have ulcerated through the gall-bladder into the duodenum and blocked it. In such cases we notice the absence both of gastric ectasy and the clinical picture of the acute dilatation of the stomach. A certain dilatation of the stomach, but only in a slight degree, is on the other hand noticed in many cases, where a chronic cholecystitis has caused a periduodenal inflammation with a successively developed stenosis of the intestine. In neither case do we get the picture of the acute dilatation of the stomach, but that of pyloric stenosis with its relative comfort after the vomiting.[1] Neither does dilatation of the stomach belong to the regular picture of the high jejunal obstruction. On the whole we are entitled to say that a gastric distention, moderate in comparison with the acute dilatation of the stomach, is usually connected with high intestinal obstruction of long, but not when it is of short, duration. In support of this statement, I mention the following case of high jejunal strangulation which has been treated in our hospital.

A. L., female, aged 47, during the last 3 years had suffered from gall-stone colic and a ventral hernia. On February 23, 1911, at Diakonhjemmet, cholecystostomy, radical operation of the hernia, and appendicectomy were performed.

Feb. 24.— The patient during the first 24 hours was somewhat exhausted, but condition otherwise quite satisfactory. Through the drain, 300 ccm. bile escaped.

Feb. 26.— Temp. hitherto normal. Yesterday evening thin greenish gastric contents were vomited. With the stomach tube nothing could be evacuated. The condition of the patient, however, is still fairly good. Flatus have been passed this morning.

Feb. 27.— In the last 3 days no bile escaped through the drain. The patient's former comfort during the night has been interrupted by headache and abdominal pain. Slight jaundice.

Feb. 28.— 50 to 100 ccm. bile has again escaped. The patient feels better.

March 1.— Temp. 37.4, 37.7; P. 124. The abdomen to the left above the navel, is distended but not tender. The patient has fallen off considerably. With the stomach tube 200 ccm. black, thin, fluid is emptied with subjective relief; but the patient sank noticeably and died 1½ hours later.

Post-mortem. A horizontal part of the duodenum does not exist; its descending part runs through an opening in the mesocolon to the right of the spine. Through this opening a loop of the topmost part of the jejunum 8 cm. long has pushed itself up beside the duodenum and been strangulated there. A slight furrow is visible on both ends of the loop. The strangulated bowel is strongly distended and has compressed both the duodenum and the common duct. The stomach is empty and of normal size or only slightly distended.

Both in obstruction by gall-stones and with a high strangulation, as in the foregoing case, the occlusion of the intestine is, however, accompanied by a complicating process, i.e., the perforation of the gall-bladder and duodenum, and secondly the strangulation of a jejunal loop. It is reasonable to suppose that

[1] I refer elsewhere to a case of acute duodenal obstruction caused by a gallstone. Borchgrevink: Complicated gallstone cases. Norsk Mag. f. Laegevidensk., 1912.

the picture of the illness will thereby attain a severer appearance than by a simple compression of the duodenum. The most perfect parallel to this we find in a high jejunal occlusion produced by compressing adhesions, as in the following case.

A. F., male, aged 60, sent to Diakonhjemmet December 3, 1909, for chronic dilatation of the stomach. December 7, posterior gastro-jejunostomy was performed on account of a stenosis caused by a duodenal ulcer. After being discharged from the hospital on January 8, 1910, the patient was quite well until March 7, 1910, when vomiting suddenly commenced reappearing after every meal. The patient lost flesh rapidly, and once more entered Diakonhjemmet March 21, 1910. The symptoms of a pyloric stenosis were again recognized. In the early morning the stomach was filled with fermenting material, the evacuation of which with the stomach tube gave immediate relief. Food and drink caused vomiting. The stomach extended downward to the umbilicus. The patient felt weak but preferred, when the stomach had been emptied, to be out of bed.

March 23, laparotomy was performed. A part of the jejunum 7 to 8 cm. below the anastomosis was found adherent to the lower end of the abdominal scar. The transverse colon was riding on the adherent loop, which had a totally obstructing kinking at the site of the adhesion. The stomach was somehwat distended, but less so than at the operation 3½ months ago. By separation of the adhesions the jejunum was freed, and as the gastro-jejunal anastomosis proved to be in order, the abdominal cavity was closed. The patient was discharged April 13, 1910, and has often since, the last time on July 10, 1912, shown himself restored to full vigor.

My observations are thus congruent with Axhausen's in regard to occlusion of the intestine below a gastro-anastomosis, of which he says: "In beiden Fällen war also trotz kompletten hochsitzenden Darmverschlusses nicht ein klinisches Bild entstanden, das dem der soganannten acuten Magendilatation irgendwie an die Seite gesetzt werden könnte."[1]

Other circumstances seem to witness against a primary intestinal obstruction as a cause of an acute dilatation of the stomach, for instance, both the rapid course of this illness and the quickness with which the dilatation develops. We have no parallel to it either in intestinal obstruction by kinking or compression of any segment of the bowel. In the majority of the non-treated and fatal cases of my collection, death occurred within two days after the first symptoms of the acute dilatation, and in most of these cases the stomach was found to extend towards the symphysis. In Hanssen-Löberg's operated case the stomach, even after the lapse of 3 to 4 hours, was distended to the lowest part of the abdominal cavity. It would also hardly be reasonable to conclude that the quickly appearing dilatation after overloading of the stomach in people in good health did not date from the overloading's direct influence on the stomach, but occurred as a result of duodenal compression. Borchardt's argument against primary compression — that a stomach which cannot overcome the resistance of a compressed duodenum thereby proves its atony — appears also to me to be of much weight. On the other hand Rosenthal's interpretation of the late appearance of the dilatation as an evidence against a post-operative paralysis due to the narcosis is based on a double misapprehension. He assumes firstly that the acutely distended stomach must be wholly paralyzed, what several observations of gastric peristalsis prove is not the case; secondly, he totally disregards the possibility that incidental causes, independent of time, as we shall see later, can bring the dilatation to develop in an enfeebled or even in a more or less healthy stomach.

The influence of a mechanical factor on the acute dilatation of the stomach is, all the same, difficult to ignore. There is too much at the later stage of the illness which tells of the presence of a real obstruction. The often slight or deficient effect of the treatment with the stomach tube, to which I have formerly called attention, seems for instance difficult to explain, if it were not that the contents of the stomach remaining after each use of the tube were in some way or other prevented from going over into the intestine. The prompt result of the abdominal posture supervening under these circumstances proves that this obstacle is of a mechanical nature. In all superfluity, the hindrance has been seen in a large number of cases. Among such may first be mentioned Kayser's and Kausch's observations of a kink of the first part of the

[1] Axhausen. Zur Frage der sogenannten postoperativen Magendilatation, etc. Deutsche med. Wchnschr., 1909, S. 145.

duodenum, and finally the 29 cases mentioned under pathological anatomy, in which an occlusion at the duodeno-jejunal junction is proved by operation or post-mortem.

That a duodenal occlusion, according to Box and Wallace's description, can sometimes be occasioned by the stomach's pressure on the duodenum where it crosses the spine, is certain enough, and with an excessive lordosis, as in Hanssen's Case 7, perfectly clear. Conner has also proved, by investigations on cadavers, that it can sometimes appear with a normal form of the spine, and the lower the duodenum crosses it the easier. But this form of compression seems to be rare, as it has been proved in numerous carefully examined cases that the large stomach exerted absolutely no pressure on the horizontal part of the duodenum.

One must seek the secondary obstruction in the condition which without doubt is oftenest observed, the arterio-mesenteric compression. And when acute dilatation of the stomach is first established, all presumed causes, such as an appropriately long mesentery, the small intestine hanging in the pelvis, etc., need scarcely be present in order that the necessary traction on the mesentery can arise. It seems more likely that the heavy and increasing stomach both empties the small intestine and drives it downward and holds it in the pelvis or in the lower part of the abdominal cavity. That a stronger dragging must be exerted on the mesentery in this way than by the mere weight of the small intestine seems probable. This is, of course, only a hypothesis, but it has so much in its favour that it scarcely has met with opposition. And the opinion that the arterio-mesenteric compression is a secondary phenomenon, and as a rule called forth by the pressure of the already distended stomach, has by degrees won more and more followers, among whom may be named Bäumler, Borchardt, Conner, von Herff, Kausch, Laffer, Steida, Thomä and Zade. Bull's carefully observed case (my case 4) gains under these circumstances special interest. It is, so far as I know, the first observation of mesenteric compression under circumstances where the true pelvis has been blocked for the small intestine, and where no other explanation for the compression is present than pressure and dragging from an only slightly distended stomach. The value of the observation is further increased by the fact that it was done in the living subject, and that the result of the treatment supports the supposed importance both of the mesenteric compression and the pressure from the stomach.

If there is reason to suppose that the acute dilatation of the stomach, at any rate in its pure form, is primary, it does not follow that the theory of its origin by paralysis of the gastric nerve apparatus necessarily must be accepted. It must be admitted that a degeneration of the muscular coat of the stomach, as slight in the acute as the chronic dilatation, has hitherto been observed microscopically; but on the other hand the observation of nervous disturbances in the acutely distended stomach appear more as a postulate than a fact. The connection between gastric dilatation and nervous disorder are, in the few known cases of the kind, doubtful enough. The right to transfer the experimental results to the human being are far from indisputable. And finally, we are absolutely without proof of a disease in the nerves of the stomach, first and foremost the pneumogastric, in a case of acute dilatation. The two facts — that a person in good health can be struck as by lightning by this illness; and that under correct treatment regularly, as for instance in my first 5 cases, it is completely cured within a few days — makes it more than difficult to assume that one has had to deal with a nerve disease in the ordinary sense.

There is one factor in the origin of acute dilatation which has certainly been noticed, but has not received such attention as Braun and Seidel give it; this is the effect of food and drink. This seems clear enough where a person in more or less good health simply eats himself to the illness, but it seems likely that the same factor also plays an important part in the case of patients lying in bed. It is thus scarcely accidental that there are among the patients no small number of reconvalescents, or that the illness in post-operative cases oftenest appears about the third day, in other words, at a time when the patient's wish for

food begins to make itself felt. By reading through the history of the cases in my collection I have succeeded in finding, in addition to the 10 more or less healthy subjects who became ill after excessive amounts of food or fluids, 32 cases where the onset of the illness was connected with a meal or ingesta of another kind, oftenest too much drinking with those upon whom laparotomy was performed; H. Albrecht, Albu, Baillet, Bäumler, Bloodgood (2 cases), Borchgrevink (3 cases), Braun and Seidel (5 cases), Engström (2 cases), Hanssen (No. 7), Ewald Heine, Kayser (2 cases), Kelling, Kirch, Laffer, Lichtenstein, Neck (3 cases), Payer (2 cases), Rosenthal, Stewart, and Thomä. There are thus, among 144 patients, 42 with whom the history includes a hint that ingesta can have been an effective incidental cause. Probably this has oftener been the case; for in post-operative cases above all a careful examination of both patient and nurse is often necessary before it is discovered that the prohibition against imprudence in drinking has been most grossly ignored. It was so in Braun and Seidel's first five cases, and in a high degree with my first and second patient. I repeat in shortened form some of the most typical histories from the above mentioned post-operative cases in which error in diet caused the outbreak of the illness. It will be seen that sometimes one overloading of the stomach after the other must occur to provoke the severe picture of dilatation.

On H. Albrecht's 37-year-old patient, amputation of the cervix uteri, colporrhaphia ant. and post., and ovariotomy were performed, April 27, 1906.

Severe post-operative vomiting, much thirst; is supplied with little fluid through the mouth.

April 28.— Condition good; P. 78, T. 36.8. Two vomitings.

April 29.— Condition not so good. Feeling of oppression in the epigastrium but no tenderness. Several vomitings; severe thirst. In the evening the patient had succeeded in obtaining plenty to drink, and before midnight the symptoms of dilatation appeared in full vigor.

Baillet's patient was a somewhat nervous 18-year-old boy who had never noticed any irregularities of the stomach. November 7, 1905, exarticulation of the arm on account of sarcoma was performed. The first day all went well; the second day the patient had a good spontaneous action of the bowels and drank "eau de Vals" and a cup of bouillon; the third day likewise he felt well, was hungry, and asked for food, when he was given a cup of "café au lait." "Quelques instants après avoir pris ce lait, il a un vomissement excessivement abondant sentant très mauvais. À partir de ce moment il ne cesse pas de vomir et de se plaindre d'un douleur au creux epigastrique."

Engström's patient No. 1 was a woman 45 years old, of medium health, who had occasionally noticed some weight in the epigastrium after meals. March 28 a supravaginal hysterectomy was performed. During the first two days the patient felt quite well. After a substantial dinner on the third day she felt some distention of the epigastrium. On the morning of the fourth day she felt well and ate a good breakfast and dinner with surprising appetite. Three quarters of an hour later the illness appears. Notwithstanding the emptying of 2 litres of contents of the stomach with the tube, death occurred after less than 24 hours' illness. As the post-mortem shows, it is to be attributed to acute dilatation of the stomach accompanied by mesenteric compression of the duodenum.

In Engström's Case 2 ovariotomy was performed on a woman 69 years old. During the first two days, complete comfort. The second evening the patient ate with good appetite: milk, sandwiches, egg, and some gruel. In the course of the night of the third day some vomiting. On the morning of the fourth day she felt better; ate an egg and drank a little milk. In the morning she drank a bottle of mineral water, whereupon the acute dilatation of the stomach set in.

Upon Rosenthal's patient No. 1, a 37-year-old woman who had hitherto always enjoyed good health, abdominal hystero-myomectomy was performed on January 8, 1908. During the first three days all was well, and the function of the bowels was good. At 8 A. M. on the fourth day the patient drank ¾ litre coffee surreptitiously. As early as 11 A. M. the scene was changed — severe pains in the epigastrium; the face like ashes. P. 100. At 5 P. M., P. 150, violent vomiting and collapse, whereupon a very severe picture of acute dilatation of the stomach developed, which disappeared under treatment by abdominal posture the sixth day after the operation.

But excess in eating and drinking is not always necessary to overfill the stomach. An almost daily experience shows us how retained contents of the stomach, especially after a laparotomy, can be multiplied. This probably occurs partly by decomposition, and therewith accompanying gas development, partly by the irritation of the stagnated contents, which causes hypersecretion. Braun and Seidel express their opinion of the significance of this state of things in the following words: "Narcose und operativer Eingriff bedingen nun zunächst nicht die Dilatation

selbst, sondern nur die motorische Insufficienz und damit die Disposition zur Dilatation. Damit die motorische Insufficienz zur Dilatation führt, ist noch eine Ueberfüllung des Magens mit flüssigen oder festen Massen bezw. eine Auftreibung mit Gasen wie im Experiment notwendig." It also appears to one that the same authors have found an appropriate expression when they declare the primary cause of acute dilatation of the stomach to be a disproportion between working capacity and the work required. Popularly expressed: One can demand too much, even of a stomach, or one may say with Laache: "when one thinks of all the injury to which a stomach is exposed in the course of time, one must be more surpised that its wall holds in the majority of cases, than that its muscular coat sometimes gives way."

On the other hand, one is probably on unsafe ground when one concludes that the stomach's failure in working power is provoked by special central or peripheral disturbances of the nervous system of which the stomach becomes the only or special prey. There is nothing which suggests, let alone proves, that the stomach in usual cases of acute gastric dilatation has received more than its share of the whole organism's debilitation in functions. When the stomach, after narcosis or other enervating conditions, is suddenly distended, it seems to conform more reasonably with clinical observations to presume that this occurs, not because the stomach in a special degree is weakened, but because it is an organ of which, under these circumstances, there can often be required too much.

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CERVICAL DECIDUA[1]

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OUR present conception of the decidua began in July, 1842, when Coste presented a report to the Paris Academy of Sciences entitled "Origine de la Caduque," stating that there was no evidence to confirm the theories of John Hunter and Matthew Baillie concerning the formation of this structure. He held, on the contrary, that the tubal and cervical orifices in the uterine cavity were patent at the time the egg entered the uterus; and claimed that the membrane in question was not an exudate, but resulted from a characteristic transformation of the pre-existing uterine mucosa. This work of Coste was followed four years later by reports of a similar tenor by Weber in Germany and Sharpey in England. It was reserved, however, for Robin, in 1848, to first describe the finer histological structure of the decidua and to show that each element had its analogue in the endometrium. The better known work of Hegar and Maier dates from 1863, yet it was not until after the appearance of Friedlander's article in 1870 and the Kundrat and Engelmann reports in 1873 that this doctrine obtained general acceptance.

At the present time the uterine decidua is considered to form only as a result of pregnancy. It is believed to be absolutely essential to all uterine pregnancies, since it has been found in all such early specimens, where it would appear that it formed a nidus for the reception and development of the ovum, and takes part subsequently in the formation of the placenta. The teaching of Heinricius, in 1891, that the membrane was intimately concerned in the nourishment of the ovum during the weeks prior to the establishment of the fœtal circulation in the chorion, has received much corroboration from investigators of the same structures in lower animals, most of whom were attracted to it by study of the fate of the glycogen. Others, as Rossi Doria, believe that it also constitutes a barrier to the entrance of syncytium into the maternal body, while Charrin and Goupil (1905) have advanced the theory that it acts as a lymphatic gland in filtering some of the toxic substances passing toward the fœtus.

With our better understanding of the unusual types of pregnancy, there are described many variations in the intensity of the decidual reaction in the uterus. The large thick decidua observed in the non-pregnant side of a double uterus has long been known, as has the similar condition in the uterus with a pregnant and rudimentary horn. Governed largely by such observations, Pozzi and Caseaux stated that the intensity of the decidual reaction in the uterus was dependent on the proximity of the ovum. This view has not obtained wide acceptance, however, although the hypertrophy of uterine muscle would appear to be so influenced. Varying conditions of uterine decidua are seen in tubal pregnancies. Thus the uterus is seldom the site of marked decidual reaction in early tubal abortion, as it is far more apt to present only in localized areas. Indeed it occurs as a well-developed layer with compact and spongy divisions only in such cases as have passed the second month, at which time the decidua of uterine pregnancy would have nearly reached the height of its development. Moreover, the papillary proliferation in the glands, deemed characteristic of normal pregnancy by Opitz, are absent in the uterine decidua of tubal pregnancy (Werth). Less is known of the uterine reaction in ovarian gestation, while none of the few cases accepted as true instances of abdominal pregnancy present detailed study of the uterine content.

As early as 1891, Bland-Sutton had drawn attention to the fact that the decidual reaction in the tube in tubal gestation was not nearly as extensive as has been believed. This view received the support of Füth and Griffiths a few years later, while others, as Kühne, Aschoff, and Kreisch, frankly stated them-

[1] Read before the Chicago Gynecological Society, December 20, 1912.

selves as skeptical of the existence of decidua in certain cases of this category, and claimed that cells frequently described as decidual were in reality of fœtal origin. Although the nihilistic views of these authors have not obtained much acceptance, certain it is that the decidual reaction at the site of tubal pregnancies may appear only in limited extent. There is, however, always the possibility of a larger and earlier area of reaction which has later become decimated by various degenerations. The presence of decidua in tubal pregnancy has been frequently demonstrated, not only in the pregnant tube but also in its fellow of the opposite side, limited for the most part to the tips of the mucosa. The decidua reflexa, or more properly capsular membrane, in consequence may contain but few or no decidual cells. A definite decidua is lacking in ovarian pregnancies, although the possibility of decidual cell formation must be admitted in the first case of Webster.

The decidual reaction was long supposed to be limited to the uterus and tubes. Gradually, however, other sites were described until we find it recorded:

1. In the mucosa of the uterine body during ectopic pregnancy.
2. In the mucosa of uterine adenomyomata during uterine pregnancy.
3. In the cervix.
4. On the posterior uterine wall, or in the cul-de-sac beneath the uterine peritoneum.
5. In the non-pregnant tube during ectopic pregnancy and in both tubes during uterine pregnancy.
6. In the ovaries and parovarian cysts.
7. In the omentum.
8. In the appendix.
9. In the serosa of the intestine.
10. In peritoneal adhesions.

It is of interest to recall that normal pregnancy is not essential for the production of decidua. The structure has been seen with hydatid mole pregnancy and also with chorioepithelioma, although in the latter instance there is always the question whether the decidua was really not preserved from the former pregnancy.

It has long been recognized that the cervix may show decidual change, although the majority of texts deny the possibility and voice the opinion of Gebhart that the internal os represents the lower limit of decidual formation. For the most part the positive cases quoted below were recorded either in articles devoted to the discussion of the origin of the lower uterine segment or else in consideration of the production of placenta prævia centralis from primary implantation of the egg in the region of the internal os. The majority of these observations are therefore in association with cases of placenta prævia.

Decidual tissue in the cervix was demonstrated by Bayer in the folds of the arbor vitæ in two cases. This observation, recorded in 1885 in an article on "The Physiology and Pathology of the Uterus," excited but little comment, possibly because it did not come to general notice. Nor did the report of Ahlfeld of a similar condition in the upper cervix of a placenta prævia arouse more interest six years later. The majority of case reports credit v. Weiss with being the first to control such observation with specimens, although it is clear that Weiss's report in 1897 is antedated 12 years by Bayer's observations. In Weiss's case the cervical mucosa appears to have furnished at least a part of the decidual serotina, which is surmounted by a firmly attached placenta prævia. Keilmann, five weeks later in the same year, reported a similar condition, although his deductions were based only on clinical findings and were not controlled by specimens.

Von Franque in 1897 presented two cases, one of which was associated with placenta prævia at the tenth month of pregnancy. The specimen was obtained from a VIII-para 4½ hours after delivery. The placenta was on the anterior uterine wall. Sections from the posterior cervical wall, 3 cm. from the external os, showed many decidual cells, between which were thin walled blood-vessels. The sections taken over an area 2 cm. long contained many developed glands containing unchanged high cylindrical epithelium. His second case is of greater interest, as it showed decidual cells in the cervix of a six months' pregnancy with a normally implanted placenta. The space between the decidua of the body and the cervix proper was unchanged

for 3 to 4 mm., below which on the crest of the arbor vitæ were seen areas of typical decidual cells, even as far down as the external os. The cervix appeared very vascular.

Ponfick in 1899 presented two cases associated with cervical placenta prævia. In the first specimen the entire upper portion of the cervical division was filled with placental tissue, which extended down as far as the external os in tongue-shaped processes, closely adherent to the underlying tissue. The second case also presented a cotyledo prævia with a condition in the cervix similar to his other case.

Krönig in 1901 describes the lower uterine segment and cervix of a 19-year-old girl who died in the ninth month of pregnancy from cardiac disease. The child was recovered by Cæsarean section during the death agony. The placenta was normally situated. Some areas of decidual cells were seen in the upper cervix.

Volk in 1903 presented a case of unusual interest. During the examination of a luetic II-para the everted cervix was found to be the seat of several reddish patches of millet-seed size which bled upon slight trauma. A section was taken for diagnosis three weeks before the onset of labor at term. The cervical tissue presented considerable œdema, while the plaques under investigation were found to consist of decidual tissue. Similar areas were seen underneath the healed erosions. In order to ascertain the frequency of decidual reaction in the cervix in placenta prævia, he removed a section from the anterior cervical wall of a woman recently delivered. The gross appearance of this lip suggested the presence of decidua, which was subsequently demonstrated by sections.

Waldstein's case, in 1903, was a twin pregnancy in a VI-para. The placenta was laterally implanted. Post-partum bleeding suggested a torn cervix, and when retractors were applied numerous plaques appeared to view, suggesting a carcinomatous change. Sections taken for diagnosis from the vascular cervix gave a picture of a healed erosion, with large and small nests of decidual cells in the neighborhood of the external os, on the cervical flaps, and also under the eroded flap of the portio vaginalis.

Hohmeier in 1905 investigated the cervical mucosa in 7 cases in various stages of pregnancy or immediately after birth. Decidua in the lower two thirds of the cervix was seen in 4 cases; twice with placenta prævia and twice with normally situated placentæ. The reaction varied in extent, sometimes being broad and extensive while in other specimens it was limited, as in the case of Volk.

Blumberg in 1905 reports a V-para who had been bleeding off and on until her fifth month of pregnancy, when examination disclosed several gray polyps the size of a bean in a large, soft, and somewhat dilated cervix. Three of the polyps were removed for examination and the labor terminated. There was placenta prævia. The polyps were found to be the seat of decidual change. His second case is that of a case which entered the Landau clinic with bleeding from retained secondary post-abortum. The day following their removal severe hæmorrhage indicated inspection of the os. Several granular areas were seen on the cervical lips, some of which were removed and found to be the seat of decidual formation.

Taussig, in his paper before our Society, reported a case of great interest on account of the multiple locations presenting decidual formation. The case was a primipara of 35 years in which a tubal pregnancy was associated with multiple uterine myomata, a cystic adenomyoma, and a parovarian cyst. The pregnancy occurred in the fimbrica ovarica, and by the spread of the placenta upon the posterior peritoneum became a case of secondary abdominal pregnancy. Decidua formation was found in the uterus, on the posterior uterine peritoneum, in the non-pregnant tube, in the parovarian cyst, in peritoneal adhesions, and in the cervix. The decidua noted in the cervix presented in the region of the internal os and for 1 cm. below, but could not be demonstrated in the lower cervical canal.

It is more than possible that the case of Seitz does not belong in this list, yet it deserves consideration on account of its many peculiar features. A woman 41 years of age, who had had nine children and two abortions, was

operated in the Munich clinic for carcinoma. Her periods had been irregular for the past two years and there had been bleeding at irregular intervals. On this account the missing of two months' menstruation had not aroused the suspicion of pregnancy, and the enlargement of the uterus had been attributed to metritis. The organ, when removed by vaginal hysterectomy, suggested pregnancy, and was preserved in toto in formalin, after some of the preservative had been injected into the specimen. Before the operation the cervix had been seen to be gaping, yet no membrane was visible in the canal. The lower cervix was considerably torn by bullet forceps. On opening the uterus several weeks later a seven weeks' pregnancy was seen, with the chorion embedded on the upper lateral wall. The sac of the fœtus contained clear fluid. Between the decidua vera and reflexa was a fresh, unorganized blood clot extending down to the internal os. The cervix presents an early carcinoma. The internal os is nearly as wide as the dilated external orifice, and projecting down throughout the length of the entire cervical canal is a fold of decidua continuous with that of the uterine body, thus extending the circumference of the decidua vera to the external os. Histologically the membrane is identical with that of the uterine body, although it is attached to the cervical tissue more loosely than that in the cavity of the corpus. The membrane is also thinner. The microscopical picture of the underlying tissue is confused, because of poor fixing of tissues and changes incidental to the developing carcinoma. Yet the author concludes that the cervix proper shows no decidual change and that the decidual membrane was forced through the somewhat dilated os by a combination of trauma during the operation and the injection of fixing fluid into the uterine cavity in the preservation of the specimen.

Kermauner in the same year (1906) mentions the presence of cervical decidua in the upper cervix of his specimen of a post-partum uterus which had presented a placenta prævia. Bondi in 1907 describes the uterus of a 37-year-old multipara which was removed in the second month of pregnancy for a carcinomatous polyp. Larger and smaller areas of decidual reaction were found in the region of the external os, some of which were covered with stratified epithelium. Decidual changes could not be demonstrated in the upper cervix.

Stroganoff (1908) records a case of polypoid proliferation on the anterior cervical lip of a three months' pregnancy. This bled freely on contact and was removed for microscopic examination. It proved to be well-developed decidua. The upper layer was here and there covered with stratified epithelium. The patient remained under observation for several months without a return of the growth and without bleeding.

Gaifami (1909) and Ballerini (1910) also describe cases in which they have demonstrated cervical tissue. Excluding the case of Seitz as not proven, and the observations of Gaifami and Ballerini, which are recorded in the Italian journals, and of which I have seen only reviews, we find in the literature 22 reports of decidual change in the cervix in our search. Thirteen of these were observed in connection with placenta prævia, 8 with normally situated placentæ, and one in tubal pregnancies. Yet the more recent articles indicate the feeling that the condition is more common than hitherto believed. Indeed Ballerini's article is quoted in review as stating that such reaction occurs in 25 per cent of cases. It is of interest to recall that, of the 8 cases reported in normally implanted placenta, the decidual areas were noted on the lower cervix in 7 instances. On the contrary, in connection with placenta prævia the findings are reversed, since the upper cervix is the usual site. That this portion of the uterus is the site of decidual changes more commonly than hitherto supposed may be inferred from Hohmeier's observations (not mentioned above) that decidua was present in the upper third of the cervix in all of his 7 cases. All cases thus far reported show that the decidual formation occurs only in localized areas without the production of a continuous membrane.

My interest in this subject was recently revived by the observation of an unusual case of pregnancy in which bleeding from the cervix followed trauma and in which a watery, bran-colored leucorrhœal discharge was a

marked symptom. At operation we found numerous small polyps surmounting bleeding areas of the thickened mucosa of a long narrow cervix with everted lips. Although the possibility of decidual growth was discussed, we then feared the tissue would prove to be malignant. The case is as follows:

Mrs. X. X., aged 22 years. The family history is negative for tuberculosis and cancer. She has never had scarlet fever, inflammatory rheumatism, nor diphtheria. Had typhoid when 13 years old, and was confined to bed by it for eight weeks. A succession of attacks of "sore throat" was relieved by the removal of the tonsils with the guillotine. At 17 she gradually ran down in health while in boarding school. Lost in weight from 105 to 96 pounds. Had a succession of colds in the head, with little or no cough but with fever. The glands near the angle of the right jaw now enlarged to the size of a hen's egg and remained swollen for 5 or 6 months, until removed by operation. The diagnosis of this condition is uncertain, although the surgeon stated that there was no evidence of tuberculosis. Two years later there was a slight recurrence and a few discrete glands were removed. Since then (2 years) has been in excellent health until present complaint.

Menstruation began at 15 years. Was regular from the first, of the thirty-day type. Never but the slightest pain. Flow lasts 5 days. No leucorrhœa.

Married in June, 1912. Last period July 5, 1912. Nausea began early in August. When 3 months pregnant, in this her first pregnancy, a blood-stained discharge resulted a few hours after coitus, and was shortly followed by painful uterine contractions. The uterine discharge upon her napkin presented a salmon pink stain of 10 or 12 cm. in diameter. It was so watery that it strongly suggested leakage from the sac of the ovum, which suspicion was intensified by the strong odor as of vernix caseosa. The discharge gradually decreased with the subsidence of the pains, although it was still present after 5 days. The pains lasted off and on for 36 hours and disappeared after the use of morphin. The patient remained in bed for 10 days. A few days later, vaginal examination disclosed a 2½ to 3 months pregnant uterus, sharply anteflexed and with a long narrow cervix as if of an infantile type. The external os pouted slightly but did not admit the finger-tip. No evidence of placenta prævia. No blood followed the examination. A speculum was not used.

Shortly after getting out of bed the patient began to complain of leucorrhœa, seemingly aggravated by exercise. Four weeks after the onset of the first attack she was seized with a similar one, save that the discharge was not so profuse and was marked with small fresh blood clots. Uterine contractions continued at frequent intervals and with increasing pain for several hours, and, feeling that she was about to abort, I sent her to the hospital. Much to our surprise the uterine pains stopped during the night after a dose of morphin, in spite of the fact that she was driven in an automobile some five miles to the hospital. The blood-stained discharge lasted 3 days and was again followed by profuse leucorrhœa. Vaginal examination was at this time similar to that of two weeks before, save that the external os felt more gaping. Later, when she was up and about or when riding in her automobile, she became conscious of bloody fluid on several occasions. No pain followed these discharges. The leucorrhœa was profuse and was found to be of a bran color and distinctly watery consistence.

Bleeding again followed coitus on November 22, without subsequent uterine contractions. Feeling that the pregnancy should not be allowed to run without a definite diagnosis of the condition, I suggested dilating the cervix enough to permit the passage of one finger to explore the neighborhood of the internal os. Upon examination in consultation, to justify the risk of abortion during this procedure, there was an immediate and profuse bloody discharge, staining the sheets for a foot in circumference with bright red blood. The immediate hæmorrhage was comparative in amount to that seen a few hours after delivery. At least four pads, folded into 4-inch width from a yard of sterile gauze, were completely saturated before the patient could be moved to the Presbyterian hospital for immediate delivery.

A few hours later, November 26, 1912, the patient was prepared for operation under ether. On exposing the cervix a most unusual condition presented to view. Projecting through the gaping os, and surmounting ridges of a bright red lining membrane, were 12 or 15 worm-like polyps moving in the oozing blood which seemed to arise from around their bases. These polyps, of varying length (4 mm. to 1 cm., and 2 to 3 mm. in diameter), appeared to crown longitudinal foldings of membrane, just as the comb of a rooster is decorated with excrescenes. The whole lining membrane of the cervical canal was arranged in longitudinal foldings about 1 cm. apart, separated from each other by furrows. The greatest thickness of the folds of the membrane proper was at the margin of the bluish vaginal where it measured 4 or 5 mm. Of the color of angleworms, the papillæ were seen, of irregular contour distended at the end in an œdematous swelling. Blood-vessels could be seen in the depths of their substance. In texture the polyps resembled brain substance, breaking off when picked up with forceps. They appeared to cover with their bases at least one fourth of the lining of the canal. The whole picture exclusive of the polyps suggested an extremely injected decidual membrane, with the difference that the furrows here ran parallel and vertical, as if they had arisen from the persistence of fœtal plica palmatæ.

As the diagnosis was by no means certain, and

fearing the possibility of sarcoma, the operative plan was changed from anterior hysterotomy to dilation of the canal and morcellation and removal of the ovum.

The internal os easily admitted the passage of a No. 8 Hegar dilator, and the vascular cervix was stretched to permit the passage of No. 26, which facilitated examination with the eye and finger. The polyps were most abundant as a ring in the lower canal, yet were present for 3 cm. above the os. They appeared to decrease in size in the higher levels. The membrane, however, presented folds to the internal os, 4½ cm. above its lower fellow. Indeed the feel above was as of numerous projections extending as papillæ down from the maternal side of the fœtal sac, which but loosely covered the internal os. The lower uterine segment appeared more funnel-shaped than usual, as if there had been no widening of the lower pole of an infantile type of uterus. The upper edge of the cervix formed a very obtuse angle with the uterine body.

The placenta was found in the right upper lateral pole of the uterus, and the 4½-month fœtus with the membranes was crushed and removed with ovum forceps. No pack was applied, but scrapings were taken from the posterior wall of the lower half of the canal for microscopic examination as a guide for subsequent treatment. Twenty-four hours later these were found to present no evidence of malignancy.

The sections showed masses of irregular polyps together with considerable free blood. The margins of the polyps were covered with high columnar epithelium, the protoplasm of which contained many granules. There were glands with crenated edges, some being full of mucus. There was marked œdema of the stroma and the cells were widely separated, showing stellate branches with vesicular oval and round shaped nuclei. There were many dilated blood-vessels, for the most part with thin wall vessels. Many lymphocytes and a few leucocytes were seen scattered through the section. In contrast with the areas just described, the tissue presenting decidual change showed an even and rounded edge. The surface epithelium was lower than in the other areas, and in certain sections presented the typical flattened surface epithelium of uterine decidua. The cell margins were distinct and the nuclei round. There were comparatively few granules noted in the protoplasm. The stroma was also very œdematous, and its cells bore no resemblance to the areas first described save that they were also of irregular and stellate shape. The cells presented the typical decidual type (Figs. 1 and 2). The nuclei were rounded. Many cells contained two nuclei. There were areas of vesiculation scattered through the sections, as if some cells had fallen from the reticulum. There were many lymphocytes in the tissues and the blood-vessels were markedly dilated. In favorable sections it will be seen that the large decidual cells

Fig. 1. The tissue on the bottom of the illustration has not undergone the decidual process.

are grouped about the blood-vessels as if beginning in the perithelial coat (Fig. 3).

Five days later, under gas, the cervix was again inspected, when the site of the former excrescences was found to be occupied by an irregular and sloughing base with no evidence of the former picture. The examination of scrapings taken from the lower and upper halves of the cervical canal merely confirmed the clinical picture.

Cervical polyps have long been recognized as a source of bleeding during pregnancy, yet I can find no case on record presenting the picture given in our case. As a rule the polyps are single and of fairly large size.

Three of the cases noted in this review show that bleeding may result from trauma of the decidual patches. Volk's case bled from contact of the numerous plaques, while Stroganoff clearly shows that the bleeding in his case came from the decidual proliferations. Blum-

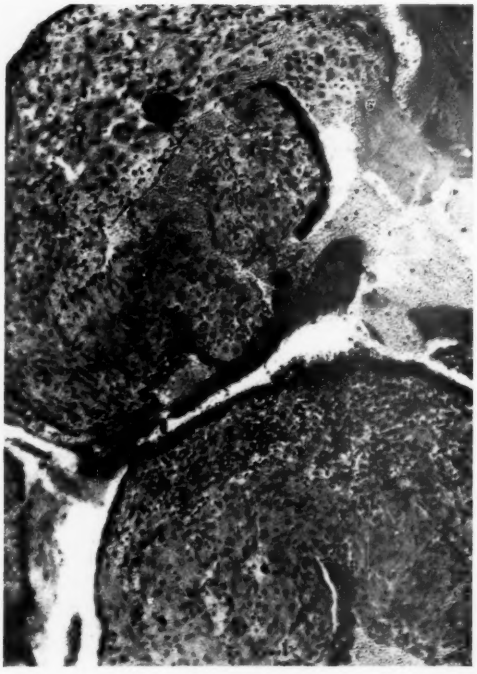

Fig. 2. Observe the flattening of the epithelium, which is well shown on one margin. The presence of the lymphocytes in the tissue obscures many of the decidual cells.

berg's first case is of interest in that there were several polyps the size of a bean in the lower cervix, yet the marked hæmorrhage may well have come from the placenta prævia. Yet it would appear that the hæmorrhage in his second case (post-abortum) arose from abrasions in the decidual area.

The treatment adopted by Stroganoff could not well have been attempted in my case, even had I been aware of his happy result. The denudation of the entire cervical cavity would present too many risks, even though it were proven that the growth was benign.

Thus far no one theory has sufficed to explain the presence of decidual tissue in all its various sites. It is doubtless true that a distinct and continuous membrane is limited to the uterus, yet the ectopic decidua which arises in connection with pregnancy cannot well be distinguished from similar areas of the compact zone of the decidua vera. And until a better test arises to determine what is and what is not decidua, we must continue to take the cell as our guide, bad guide though it be, provided the diagnosis is controlled by the study of wide enough areas and sufficient sections.

Cervical decidua associated with placenta prævia may be extension from above downward, if the histological os grows in size during the formation of the lower uterine segment, as suggested by Bayer; yet a vascular cervix is described in the cases of the literature as a common feature to all. It may be that cervical tissue does not always arise from the stimulus of pregnancy alone, and the irritant of inflammation may commonly be necessary. Certain it is, however, that malignant tumors, circumscribed inflammations, erosions, polyps, etc., are reported most frequently with decidua in this unusual site.

Fig. 3. Decidual cells may be seen on the side of the small blood-vessel, apparently arising from the perithelial layer.

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THE FATE OF BONE GRAFTS

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THE present active interest in bone and joint operations of the plastic sort makes urgent an exact knowledge of the processes of repair of bone and cartilage and especially an accurate knowledge of the ultimate fate of fragments of bone when transplanted or otherwise deprived of their normal nutrition.

Much work, both clinical and experimental, has already been done along these lines. Clinical work has given some results that show great promise for the future; but clinical work alone, even with adequate experience, can never give the necessary data as to what happens to transplants, or to bone or cartilage deprived of direct vascular nutrition. Successful clinical cases can never give a conclusive answer as to the manner of repair, or

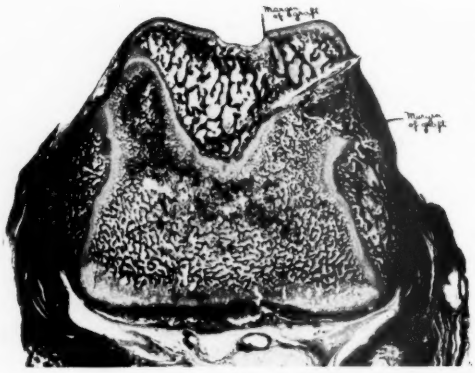


Fig. 1. Cross section of young cat's femur the condyles showing transplant at 18 days. The straight line running obliquely across the graft is the site where the fixation pin was driven in. Both the line of section and the original cut of the graft invade the epiphyseal line.

more than an indication of the limitations which must be faced.

Experimental work in the past, has not given sufficient fundamental knowledge to explain satisfactorily the clinical successes and the failures, or to guide future work.

Many statements of belief have been made with a dogmatic definiteness that savors of finality, but they have been accompanied by no sufficient demonstration; there has resulted a controversy, increased perhaps by a lack of uniformity in terms, which leaves the subject in an exceedingly confused state. The arguments as to the fate of bone grafts divide workers into two well defined groups. At one extreme are those who believe that the bone graft is retained without essential change in the bone transplanted and that it is in itself an active center of centrifugal growth, so to speak; those who believe, in other words, that the graft loses nothing and has all its inherent powers of growth undisturbed. At the other extreme stand those who believe the transplanted bone is ultimately replaced by newly formed bone; that the graft is merely a scaffolding, taking no active part in repair, and is replaced by the reparative power of tissues entirely outside itself.

We believe that we are in a position to prove that neither of these views is a correct statement of the facts.

Such difference of opinion can only be settled by a clear demonstration of the details of the reparative processes in bone and the ultimate fate of grafts; by a knowledge of fundamentals only to be acquired by properly conducted and controlled experimentation combined with an accurate study and interpretation of operative specimens and clinical cases.

It is with the belief that our experiments give facts toward the solution of this problem that we make this preliminary report.

We have been working on a series of experimental operations covering, in various aspects, the question of the fate of transplants of bone and cartilage, and certain other unanswered questions as to bone and cartilage repair. Such work of necessity will show an independent repetition of more or less of the work of others and is more likely to give a clear perspective than to develop absolutely new facts.

As a whole the work is far from complete, the earliest operation having been done about a year ago. However, one series of experimental specimens of free transplants of portions of bone within joints has demonstrated clearly certain broad principles of repair not generally recognized.

Accordingly, this preliminary report is offered with a statement of what we believe already proved as to the fate of transplants of spongy bone when transplantation is performed under adequate technique and is properly studied. There seems no question that the principle here demonstrated is *the* fundamental process of aseptic repair from endosteum.

Our experimental procedure has been to interchange portions of the femoral condyles; i. e., to remove a portion of one condyle and replace it with a corresponding part of the opposite femur of the same animal. The transplants have not been scale transplants, but pieces of bone of considerable size covered with the articular cartilage on one side. (Fig. 1.) In our early experiments a small steel pin was used for fixation of the graft. No joint-fixation has been necessary. Cats and rabbits of varying ages have been used. The animals show little or no impairment of function, even immediately after operation.

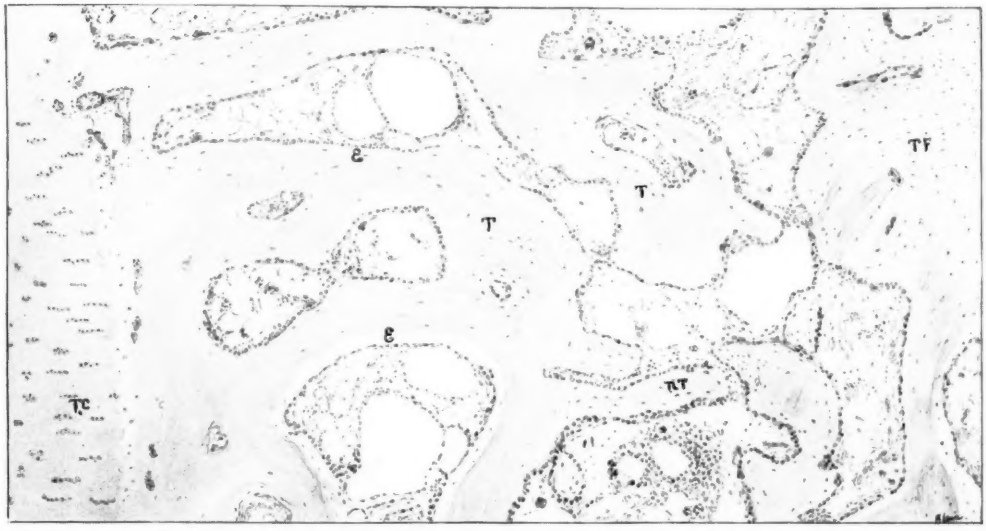


Fig. 2. Section of transplanted bone (rabbit). Four weeks after operation. At the right side is seen the bone of the intact part of the femur; all the rest is graft, the articular cartilage shows at the left. Note the almost entire disappearance of bone cells in the trabeculae of the transplant and in the vicinity of the cut edge. Note also the serried rows of active osteoblasts everywhere. TC, base of transplanted articular cartilage, E, endosteal new bone covering transplanted trabeculæ; T, trabeculæ of transplant—bone cells nearly all degenerated, many entirely gone; NT, entirely new trabeculæ; TT, trabecula of femur.

Our specimens show a practically uniform survival of the transplant when the technique is adequate; adequate technique comprising real asepsis, fair approximation of the graft to its bed, and reasonable fixation of the graft.

The articular cartilage of the transplant usually shows no gross change in color or texture from that of the surrounding undisturbed joint surface.

In some few instances the cartilage of the transplant has shown a slightly less bluish color than the surrounding articular surfaces; this has not, however, been the rule.

The fragment very rapidly becomes firmly fixed in place.

Adhesions are absent or at most are few and very delicate; this absence of adhesions is probably due to the constant use of the joint.

Histological preparations obtained at varying intervals show a series of changes in the bony portions of the grafts, the more important of which are constant and very definite.

It is not our intention in this preliminary report to describe in detail the changes of secondary importance or of inconstant appearance. The essential picture shown is, briefly: (1) the early disappearance of the bone corpuscles in the transplanted trabeculæ and in the trabeculæ of the host bone for a short distance from the wound surface; (2) without any loss of substance in (or any marked foreign body reaction around) the bone from which the corpuscles have disappeared, this bone is rapidly and completely covered by a layer of new endosteal bone, which unites with endosteal new bone of the host; (3) the new bone is laid down by the activity of end-osteoblasts in all portions of the grafts, center as well as periphery. It has not yet been proved that some of the end-osteoblasts which are active in the graft may not have originated from the endosteum of the host, and extended or even "migrated" from it to the graft, but no one after study of our sections can doubt that in part at least these osteoblasts represent the actively proliferating covering membranes of the transplanted trabeculæ; (4) practically no changes, either of degeneration or proliferation in the transplanted articular cartilage, at least up to four weeks.

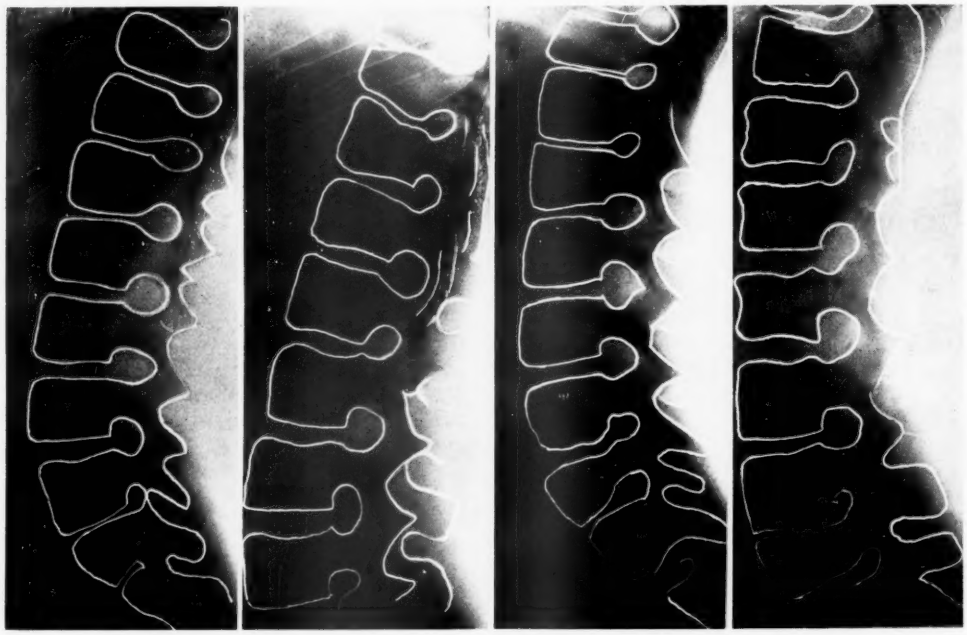
DEPARTMENT OF TECHNIQUE

THE SPINAL COLUMN AS AFFECTED BY TRACTION AND HYPEREXTENSION—A RADIOGRAPHIC STUDY

By NATHANIEL ALLISON, M. D., and ARCHER O'REILLY, M. D., Saint Louis

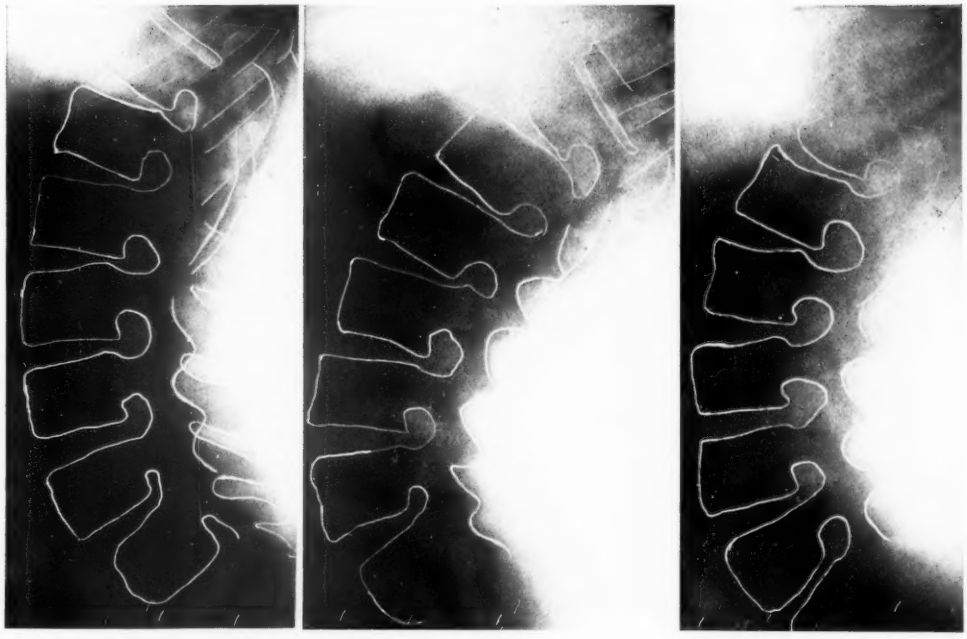
FOR the purpose of removing the pressure upon the diseased vertebral body caused by superimposed weight, and in order to transfer this stress to the posterior parts of the spinal structure, it has been the custom in the treatment of Pott's disease to employ such force as is needed to produce a separation of the vertebral bodies. This has been accomplished by either pulling the spine out by vertical traction or by bending the spine so as to gain a curve with its convexity forward. Clinically, it is universally recognized that by this separation of vertebral bodies, secured by plaster of Paris jackets or braces, the tendency to deformity is lessened and the integrity of the vertebral body and intervertebral disk is preserved.

It is the purpose of the observations herein described to attempt to determine the actual effect produced upon the spinal column, in so far as the relationship of the bodies of the vertebræ to each other is concerned, by the ordinary clinical methods used in the application of plaster of Paris jackets.



a *b* *c* *d*

Fig. 1. Normal spine: (*a*) Erect standing only, (*b*) vertical traction applied, (*c*) hyperextension applied, (*d*) hyper extension and vertical traction applied.



a *b* *c*

Fig. 2. Dorsal Pott's disease: (*a*) vertical traction applied, (*b*) hyperextension applied, (*c*) hyperextension and vertical traction applied.

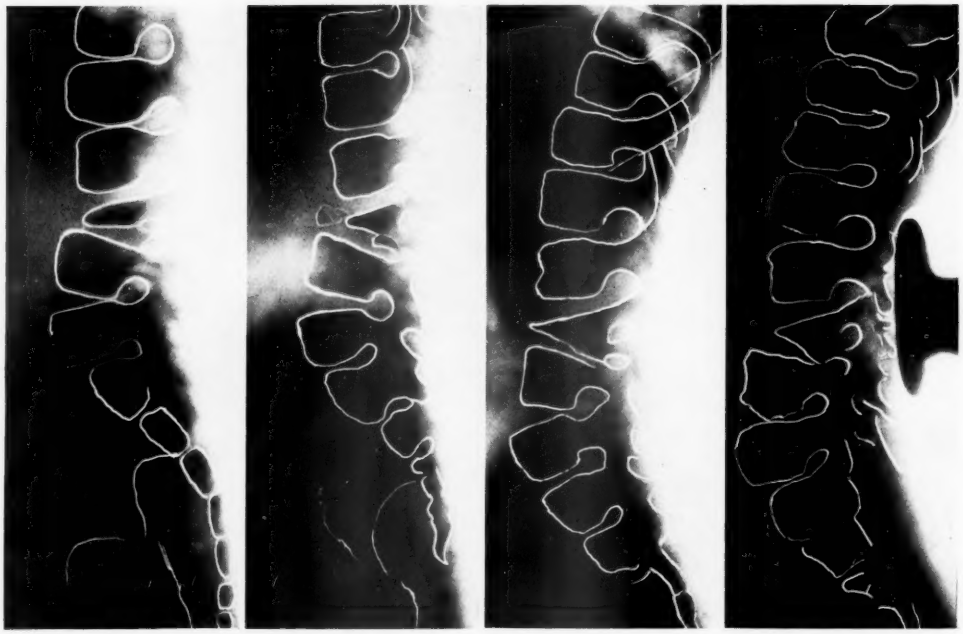
It was early recognized that reliable, readable radiograms could not be secured when taken through plaster of Paris jackets, and it was discovered that fenestrated jackets, where the windows cut were large enough to allow a lateral view of the spinal column, presented too great an alteration in the condition, which should be as nearly uniform and stable as possible and which should represent the spinal column as held by a properly applied jacket. The necessity of securing in each series of radiograms a precise lateral view of the spinal column — that is, one in which the axis of Röntgen light was approximately at right angles to the mid-sagittal plane of the spinal column — was calculated upon, and a device was made which supplied the various positions of the spine obtained in the application of jackets and at the same time held the individual under examination in a fixed relationship to both the Röntgen tube and the sensitive photographic plate.

This device consisted of a gaspipe frame standing vertically, from the top of which a rod extended forward, which carried the vertical traction pulleys and head sling. Two adjustable shoulder girdle supports also ran forward, to secure the shoulders by axillary loops. An adjustable pelvic belt also extended forward from the frame, and there was a sliding screw pressure plate which could be placed against any region of the spine, by which any desired amount of hyperextending force could be secured. The Röntgen tube was then placed at a known and recorded distance from the individual's side and the sensitive photographic plate was fixed against the opposite side. These conditions were kept as constant as possible, in order to secure radiograms for comparative study. The following series of radiograms were taken:

1. Normal spine in childhood:
   (*a*) Vertical traction applied.
   (*b*) Hyperextension applied.
   (*c*) Hyperextension and vertical traction applied.

For the above set of views three children, aged respectively five, seven and nine years, were used. The spinal columns in these cases were normal.

2. Pott's disease, dorsal:
   (*a*) Vertical traction applied.
   (*b*) Hyperextension applied.



a *b* *c* *d*

Fig. 3. Lumbar Pott's disease: (*a*) Erect standing only, (*b*) vertical traction applied, (*c*) hyperextension applied, (*d*) hyperextension and vertical traction applied.

(*c*) Hyperextension and vertical traction applied.

For this set of views two cases of dorsal Pott's disease were selected, aged respectively five and seven years. The disease in these cases had reached a stage of well-marked deformity, but in neither of them were there active symptoms.

3. Pott's disease, lumbar:

(*a*) Erect standing only.

(*b*) Vertical traction applied.

(*c*) Hyperextension applied.

(*d*) Hyperextension and vertical traction applied.

For this set of views two cases of Pott's disease at or near the dorso-lumbar junction were selected, aged seven and eleven years respectively. In each case there was well-marked deformity and the patient presented no symptoms of acute process.

The series of radiograms obtained were of such a character that reproduction of many of them was not possible; though the vertebral bodies were visible in the plates, the varying densities of the structures made photographic reproductions unintelligible. It was, however, possible in studying the plates in series to see the effect produced upon the spinal column by vertical traction, by hyperextension, and by a combination of these two forces. It was found that vertical traction alone produced a considerable separation of the vertebral bodies, both in health and in disease; also that by vertical traction the spinal column was straightened as a whole — that is, the posterior dorsal curve and the anterior lumbar curve were considerably reduced. By hyperextension alone a wide separation of the vertebral bodies was secured in the region to which the hyperextension was applied, but there was a corresponding compensatory increase in the other curves of the spine. By hyperextension and vertical traction a wide separation of the vertebral bodies was secured without so great an increase in the compensatory curves as where hyperextension alone was used, and a lessened kyphosis, with a separation of diseased bodies at the region of the disease.

It may be concluded that vertical traction, associated with hyperextension, gives the best resultant position to vertebral bodies that can be obtained by the use of apparatus for securing correction in the treatment of Pott's disease.

SILVER IODIDE EMULSION—A NEW MEDIUM FOR SKIAGRAPHY OF THE URINARY TRACT

By HOWARD A. KELLY, M. D., and ROBERT M. LEWIS, M. D., Baltimore

Of the many preparations recommended for use in the urinary tract for X-ray purposes, none can be said to be without disadvantages. Collargol is probably the most widely used and may be taken as a good example of the group. The chief objections to collargol are three in number:

1. It is a dirty drug, which stains everything with which it comes in contact.

2. The expense of collargol is considerable if one is doing any amount of urinary radiographic work. A well-known urologist lately injected as much as twelve dollars' worth of the substance in attempting to get a radiogram of a diverticulum of the bladder. Even with this amount his result was not satisfactory.

3. Collargol is a proprietary preparation; consequently one does not really know what is being injected into the bladder. ureter, or renal pelvis. This we consider an important argument against its use, given a satisfactory substitute.

Reports of harmful results following collargol injection have come from various sources. In two cases operated upon by Kelly in the last few months, which were previously injected with collargol (by an assistant), it was noticed that the perirenal tissues were stained a greenish black, the collargol having passed through the pelvis although the latter was intact. In neither case was an excessive amount of the solution injected, nor was it run in rapidly. In the first case it was feared that the pelvis had been ruptured; this was not the case, however, in either instance. One of these cases required prolonged drainage before healing.

To be suitable for use in the urinary tract as a skiagraphic medium a liquid must have at least three properties: It must be sufficiently obstructive to the X-ray to cast a good shadow when used in small amounts, it must be non-toxic, and non-irritant.

None of the bismuth preparations are satisfactory. The soluble salts are toxic and so cannot be used. The insoluble salts settle rapidly from the best suspension, and so are not of service. The various simple solutions of silver salts are very irritating.

The use of an emulsion of the iodide of silver for skiagraphic purposes was suggested to us by the fact that it has already been successfully used therapeutically in the urethra and bladder.[1]

The iodide of silver is insoluble in water and it is therefore necessary to suspend it. This Siter found was best accomplished in mucilage of quince seed. If the emulsion is well and carefully prepared the salt will be held up for a considerable length of time. It should be noted that the quality of the preparation made up by different firms varies a great deal. A suspension of inferior quality should not be used. A suspension of extra fine particles can be obtained by the addition of an excess of potassium iodide to the silver solution and reprecipitation by the addition of water. This we have found unnecessary and undesirable.

The advantages of our preparation over others are: Its cleanliness; it does not stain. The exact strength used is known and can be controlled. On the other hand, the concentration of the proprietary preparations is unknown, and according to Siter varies to a considerable degree. The emulsion of silver iodide possesses antiseptic properties. It is also bland and entirely non-irritant. The cost of the preparation is inconsiderable, amounting as a rule to one dollar a pint, as compared with the cost of collargol, which is over five dollars for the same quantity.

As an objection to the use of any emulsion in the ureters and renal pelvis it has been urged that the salt would be likely to settle, to remain in the pelvis or ureter and form a nidus for future calculi. With this in mind we have carefully investigated cases after injections of silver iodide, and have come to the conclusion that this objection is more theoretical than real. This point will be brought out under the descriptions of the illustrations.

The plates described were both made of ureters injected with 5 per cent emulsion of silver iodide. This concentration we find to be sufficient for any ordinary work. It casts a decidedly better shadow than does collargol of equal strength. The shadow is fully as dense as that made by a 10 per cent collargol solution. These facts were determined by taking radiograms of test tubes containing the solutions mentioned. A less concentrated preparation may be employed if a

[1] "The Use of Iodide of Silver in Urethritis." by E. H. Siter, M. D., and A. A. Uhle, M. D., Univ. of Penn. Med Bull., May, 1905.

cavity of any size is to be injected. For example, a 1 per cent emulsion may be used to advantage in the X-ray work on a large hydronephrotic ureter and pelvis or in the bladder. In skiagraphy of the latter we find a sterile suspension of bismuth subnitrate in water satisfactory and inexpensive.

Fig 1. A calculus is shown lodged in the left ureter low down in the pelvis. A catheter was introduced past the stone up to the pelvis of the kidney and 175 cc. of clear urine withdrawn in a

Fig. 1.

few minutes; 16 cc. of a 5 per cent silver iodide emulsion were then slowly injected. This caused no pain during injection or subsequently. A local plate of the kidney shows the opaque solution in the pelvis, which is not distended. The illustration is a reproduction of a plate taken of the lower ureter, showing very clearly its distended condition above the stone. None of the injection has as yet found its way downward past the obstruction into the bladder.

Before withdrawing the catheter the injection was given several minutes to run out. A few cubic centimeters of sterile water were used to wash away the remaining particles. Two days later cystoscopic examination showed a small amount of silver iodide clinging to the ureteral orifice. Another X-ray examination of the ureter and kidney at this time failed to demonstrate the presence of the least amount of any opaque substance above the stone, although the plates were unusually good.

During the operation for the removal of the calculus, five days after the X-ray examination, the ureter was opened and its mucosa inspected, but no particle of silver iodide could be demonstrated.

Fig. 2 shows the pelvis of what proved to be a normal kidney injected with 8 cc. of 5 per cent silver iodide emulsion. Here the shadows of the papillæ are remarkably well defined. In this case a second radiogram of the ureter taken a few days after the first, as expected, failed to show any trace of the salt remaining behind.

In view of these cases we conclude that the emulsion is a safe preparation to use for radiography of the entire urinary tract, and that there

Fig. 2.

is no danger of any precipitate remaining in the ureter and acting as a nidus for future calculus formation.

SUMMARY

A 5 per cent silver iodide emulsion may be safely and satisfactorily used to inject the bladder, ureters, and renal pelvis for radiographic work. It casts as dark a shadow as does an equal amount of a 10 per cent collargol solution.

It is antiseptic, non-irritant, clean, and inexpensive. Its concentration can be accurately determined and regulated. It possesses the great advantage of not being a proprietary preparation.

GALL-STONE ILEUS

With a Report of Two Cases and Two Methods of Opening the Intestine

By JAMES SPENCER BROWN, M. D., Montclair, New Jersey
Surgeon in Chief, Mountainside Hospital

CASES of intestinal obstruction are comparatively rare, and gall-stone ileus seems to be the rarest form of obstruction. Edward could find only 250 cases of gall-stone ileus recorded up to 1910. Bradbury reported one case out of 50,000 patients treated at the Rochester Royal Infirmary. Mayo Robson records only 4 cases out of 80,000 in-patients and several hundred thousand out-patients applying for treatment at the four largest hospitals in Great Britain, or about one gall-stone ileus to every 75,000 other cases. Frank Martin, after "searching investigation among eminent surgeons, could find only 16 cases of gall-stone obstruction in about 540,000 operative cases," or one in about every 33,000. Barnard of the London Hospital reports 8 cases out of 800 cases of intestinal obstruction from all causes. Of these 8, 3 recovered from the operation and 5 died. A recent report from the Johns Hopkins Hospital, combined with the Union Protestant Infirmary and St. Agnes Hospital, records only one case of gall-stone ileus out of 280 cases of intestinal obstruction.

The records in my own surgical service at the Mountainside Hospital differ somewhat from the above, and show that, while there was one case of intestinal obstruction to every 100 operative abdominal cases, there was an average of only one gall-stone ileus to every 750 other forms of abdominal cases. Or, stated otherwise, intestinal obstruction from gall-stones occurred only one twelfth as frequently as obstruction from other causes.

From the foregoing statement of carefully collected statistics it is evident that even a very busy surgeon will have relatively few opportunities to study gall-stone ileus. Yet, curiously enough, the diagnosis is easily made in most cases. It is true that the symptoms may simulate certain cancerous conditions; but in such cases it is highly probable that the previous history of the case will help to clear up the diagnosis.

Unlike other forms of intestinal obstruction, the onset of an attack of gall-stone ileus is usually gradual, and frequently intermittent in character. That is, the symptoms of intestinal obstruction may terminate suddenly, only to recur, perhaps several times before operation. But in cases where the occlusion is complete without remission, the clinical picture presented is that of the gradual closure of the lumen of the gut. In these cases the stone is of such shape and so placed that it remains as a stationary plug to the intestine, and the closure is complete from the first. In cases that are intermittent or remittent in character, the shape of the stone is such that, although it forms a complete occluding plug to the intestine when in certain positions, it does not maintain these positions well at first. It may plug the gut completely for a few hours, thus causing the typical symptoms of intestinal obstruction; but these symptoms may abate suddenly as the stone is displaced, only to recur as the stone again falls into an occluding position.

In a recent article on gall-stone ileus the X-ray as a means of diagnosis was mentioned. In cases where there are symptoms of a partial obstruction, if the X-ray findings could be depended upon this method of diagnosis might be of value. But as a rule when the surgeon sees these cases there is no doubt about the method of procedure—they are cases of obstruction due to some mechanical cause, and operation offers the only means of relief. In order to satisfy my own mind about the usefulness of the X-ray findings, however, I made some experiments upon fat women with a good deal of intestinal disturbance. Without preparation I placed upon the abdomen the larger stone shown in the photograph. With one of the best interruptless machine, whether screen was used or not, the detail of the intestinal contents was so pronounced that it is very questionable whether the stone could have been identified had I not known it was there.

The operation in cases of gall-stone ileus, as in other cases of intestinal obstruction, presents little difficulty as a rule. The seat of the obstruction is located easily, either by following down the distended upper intestine to the obstruction point or by following up the lower collapsed portion of the gut. But my experience seems to show that the method of incising the gut may be vital, as illustrated by the two following cases:

Fig. 2. Fig. 1.

Enteroliths removed from the two cases reported. Reduced one-fifth.

Case 1. Mrs. S., 76 years old. Seen in consultation with Dr. Wallace in 1906. Sixteen years ago this patient had an attack of pain which was diagnosed as gall-stone colic. Two years later she had a second attack which was marked by severe epigastric pain, fever, and jaundice, lasting about two weeks. There was a sudden subsidence of all symptoms and the patient was restored to health except that from that time until the beginning of the present attack there was always distress a few hours after taking food. This distress was low in the epigastrium to the left of the midline. Forty-eight hours before I saw her she was taken with severe epigastric pain, with no fever or acceleration of pulse. Her other symptoms were rather indefinite for 24 hours, when it was evident that she was developing an intestinal obstruction. At the time of the consultation the obstruction was complete, and no gas had been passed for several hours. The abdomen was rigid, distended, and painful; temperature (rectal) 100°, pulse 124, and weak.

Operation by midline incision. By following the collapsed intestine a large enterolith was found completely occluding the upper part of the ileum. A longitudinal incision was made and the stone, which was a faceted gall-stone, was delivered. This stone is shown in Fig. 1. On closing the rather generous incision necessary for the removal of the stone, it was apparent that there would be left an intestine with a contracted lumen as shown in the drawing. Therefore a rapid exsection was performed. The time of this operation was one hour. The patient lived a few hours and died from shock. No post-mortem was made.

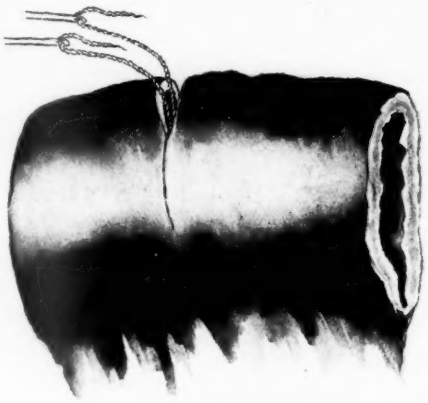
Case 2. Mrs. M., 63 years old, the wife of a New York physician, was seen in June, 1912, in consultation with Dr. Irving Meeker and her husband. She was a well-nourished woman, with a history of previous attacks of pain simulating gall-stone colic. Her present illness began 48 hours previous to my visit, with abdominal pain; no rise in temperature for the first 24 hours, but with some tenderness over the umbilicus. She slowly developed an intestinal obstruction, which was complete at the time of my visit: there had been no passage of gas for several hours. Her abdomen was now distended, tympanitic, and rigid, with very great general tenderness over the umbilicus. Her temperature was 101° (rectal); pulse 94, and soft.

Operation. Midline incision, presenting intestine distended; the obstruction was found in the ileum, which contained a large enterolith (Fig. 2). Profiting by my experience in Case 1, I made a cross-incision and removed a large, faceted gall-stone; then, removing the upper clamp on the intestine, I introduced a Moynihan tube and emptied the intestine of a quart or more of liquid fæces. A double Connell or "harness-maker's" suture was run in, followed by a running Lembert, and the abdomen was closed. Time of operation, 30 minutes. Her recovery was uneventful.

In my first operation, cited above, the incision in the gut was made longitudinally. Now consider what stru tures are severed by such an incision: A thin longitudinal external muscular layer is split; a much thicker (and more important) internal muscular layer has its circular fibers severed across; a large number of valvulæ conniventes which run at right angles to the line of incision may be severed, and with them the innumerable vessels and lymphatics (lacteals) which are distributed transversely in the intestine. Thus we have the greatest possible destruction of important muscle fibers, vessels, and extensive mucous surfaces. On physiological grounds, then, this method of incision, although the usual one, is wrong.

Observe what happens when the incision is made transversely: A thin and relatively unimportant external muscular layer is cut across; a thick, important circular muscular layer is split and injured only slightly; and perhaps half a dozen or less valvulæ conniventes are split and their vessels severed, in contrast to the wholesale destruction of these structures by the longitudinal incision.

Of course this is of minor importance practically, since the tremendously active collateral circulation in the intestines will take care of any

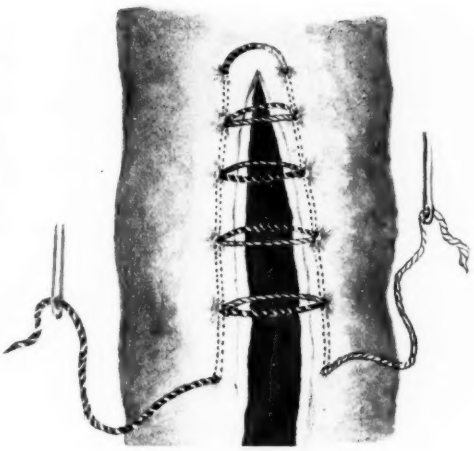


Showing proper transverse incision of intestine.

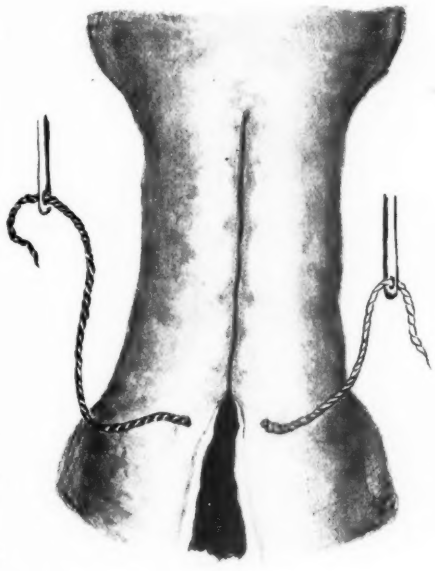
ordinary destruction of tissues. What does concern us vitally, however, is the fact that in closing a longitudinal incision we may close the lumen of the gut, thus producing in effect the very condition we are trying to overcome. When the transverse incision is used there is no possibility of this. The operator may practically disregard the amount of intestinal wall taken up by the sutures, whereas in closing the longitudinal incision he is limited to a scant 3 inches, external measurement, and very much less than this internally.

While it is true that it matters little just which stitch is used in stomach or intestinal work, since the really important thing is always the "man behind the needle" rather than the form of suture, still it is strange that so useful a stitch as the double Connell, or harness-maker's stitch, should be discarded by so many operators. This stitch offers many advantages over the single Connell. And while it is true that its application is more difficult, nevertheless one may master its technique if one remembers two points: first, all advance is to be made on the mucous membrane side; and, secondly, both needles must be pushed from the peritoneum to the mucous membrane before advance is started.

The single Connell stitch does not include all the blood-vessels, and therefore some bleeding s possible—bleeding that may be severe; while with he double stitch, as shown in the drawing, no bleeding can take place. We have used this stitch now for four years in all our stomach and intestinal work, without a single case of bleeding or leakage; wherefore I am prompted to again call the attention of the profession to its merits.



Double Connell, or harness-maker's stitch. (One-half of the suture is represented as black in the drawing so that the course of each needle may be more easily followed.)



Showing contraction in closing the longitudinal incision.

A FURTHER CONSIDERATION OF THE USE OF CORPORA LUTEA IN THE TREATMENT OF ARTIFICIAL MENOPAUSE

By CHARLES A. HILL, M. D., Pittsburgh
Surgeon, Presbyterian Hospital

SINCE the publication of my previous paper,[1] I have received many reports of either partial or complete failures in the treatment of artificial menopause with desiccated corpora lutea along the lines laid down at that time. The results obtained in my own practice were so much at variance with the reports received from some of my fellow-practitioners that I determined to investigate, and report if possible the cause of such failures. As a result of such investigation I found that insufficient medication was the prime factor in the failures to control the symptoms of menopause following the removal of both ovaries; in some cases as few as twenty-four 5 grain capsules were administered, while in others the maximum amount given was 100 capsules. If you will stop for a moment and consider just the condition your patient presents at the time of induced menopause — the abrupt precipitation, the patient complaining from the very start of hot flushes, the nervous symptoms manifested, etc.— you will understand why the treatment would of necessity be one of some duration. As many of these patients are young women, they present all the symptoms of natural menopause in an aggravated form, for it is well known that the severity of the symptoms are in proportion to the age of the patient; that is to say, the nearer she is to normal menopause the less will be the discomfort.

The disturbing symptoms usually appear within a short time after the operation, being experienced in many cases at the time the next period should manifest itself, and continue, unless relief is given, for a period of from eighteen months to three years. It has been my experience that the symptoms of menopause may cease for a time after instituting treatment with corpora lutea, and then reappear after its administration has been discontinued.

This fact indicates, in my opinion, that the medication was not continued over a sufficient length of time, and that in each instance it should be continued for several weeks after the patient presents a normal condition. I have found it necessary in most of my cases to give at least 100 capsules, in others 200, before I felt safe in discontinuing treatment.

In cases of relapse, the second course of treatment is usually much shorter than the first, fewer capsules bringing the desired result. In every instance treatment should be instituted as soon after the operation as possible. My procedure has been to administer five grains three times a day, one half to one hour before meals.

[1] "The Use of Corpora Lutea in Gynecology, with Report of Cases," Surg., Gynec. & Obst., Dec., 1910.

REMOVAL OF STRAIN FROM THE ROUND LIGAMENTS WHILE HEALING, AFTER CORRECTING RETROVERSION OF THE UTERUS

By W. T. COUGHLIN, M. D., Saint Louis
Assistant Professor of Surgery, Chief of Clinic, St. Louis University

THE more operations devised for the cure of a condition, the less likely is any one to be always satisfactory. There are many operations for the cure of retroversion and prolapse of the uterus, and when another variation is made in the procedure we smile.

Alquié thought he had solved the problem in 1841, but it took just forty-one years before anyone else thought as he did, for it was then that Alexander reported his success with the same method and described the operation which has since borne his name. Since Alexander we have had many others, and the end is not yet. The reason is that no single method is satisfactory in all cases. Since the conditions vary, so should the modes of cure.

In October, 1911, while attempting to fix forward a retroverted uterus, I found the round ligaments so small and thin that I feared no lasting benefit would follow the usual procedure.

I took a strand of No. 2 hard chromic catgut, doubled it, and grasped the end in the usual curved forceps. The point of the forceps entered the left external abdominal ring, traversed the inguinal canal, and presented in the subperitoneal space at the left internal abdominal ring. Still in the subperitoneal space, it was made to follow the line of the left round ligament till within two inches of the uterus. The peritoneum over the point of the forceps was now cut and the double catgut strand seized by a second forceps and, being released from the first forceps, was drawn into the abdominal cavity.

The left round ligament was grasped in the usual way and drawn out in the usual manner by the first forceps. The catgut was now picked up on a curved needle where it had come through the peritoneum and the needle passed through the incision into the retroperitoneal space, along the ligament to the left cornu uteri, then through the left broad ligament in the tubo-uterine angle. The two strands of catgut were now carried singly and ¾ of an inch apart across the posterior aspect of the body of the uterus under the serous coat, then together through the tubo-uterine angle of the right broad ligament, then along the right round ligament in the subperitoneal space to a point two inches from the uterus. A curved forceps now introduced through the external abdominal ring on this side was passed up the inguinal canal and into the subperitoneal space at the right internal abdominal ring and made to follow along the right round ligament to a point two inches from the uterus, where it was brought through the peritoneum and the round ligament and the catgut caught and drawn out by it. Care was taken, as is always done in similar operations, to see that no dimpling of the peritoneum occurred around either ligament as it was drawn through the internal ring. The median wound was closed in the usual way, the ligaments sewn to the anterior surfaces of the anterior sheaths of the recti, and then the catgut was tied so as to take all strain off the ligaments. The perineum was repaired. The patient was allowed to lie on back or side as pleased her during convalescence. Union was per primam. The patient left the hospital at the end of three weeks.

Of all the patients I have been able to examine after an operation for retroversion and prolapse of the uterus, the result in this case was the best I have ever seen. The uterus remains higher up and more anteverted than in any of the others, and the patient is well and happy.

BIRTH BY CONDUPLICATO CORPORE

By N. SPROAT HEANEY, M. D., Chicago

WHEN a transverse presentation has so far persisted that the membranes have ruptured and the shoulder has engaged in the pelvis, with the arm prolapsed in the vagina, the chance of the woman delivering spontaneously is very small. If the fœtus is not decidedly premature, very soft and compressible, the woman generally dies, undelivered, from rupture of the uterus. The larger the fœtus and the smaller the pelvis, the greater the probability of this occurrence. Spontaneous birth by a persistent transverse presentation is an obstetrical rarity.

Birth may be effected by the slipping of the lower body half past the head and shoulders—spontaneous evolution. In such an event there is delivery first of the trunk and breech, then of the legs and last of all of the head. When this evolution occurs in the upper part of the pelvis, the shoulder rises, manifested by the prolapsed arm ascending the vagina, in which case the birth is said to occur by Denman's mechanism. In the event, however, that the shoulder has descended to the vulva, the breech will have to pass the shoulder at the outlet, in which case the arm cannot ascend since the shoulder is fixed. This rarer variation of the mechanism is named after Douglas. Quite a number of births by spontaneous evolution are found in the literature. Payr collected 38 well described cases, among which were 14 children above 2,500 grams in weight; two of these were born alive—one, indeed, weighing 3,270 grams.

Roederer, in the eighteenth century, told of the possibility of spontaneous birth in transverse cases by doubling of the body, and called the mechanism conduplicato corpore. In this mechanism the shoulder and arm continue to descend, the body is folded and compressed on itself, the head is pressed into the thorax or abdomen, and birth occurs by expulsion of the pro-

lapsed arm and shoulder, followed by the simultaneous extrusion of the head and trunk, breech and second arm; the feet are born last of all. In birth by spontaneous evolution, the head is born last.

Though this mechanism may occasionally be seen in miscarriages, it is much rarer in births after the period of viability than is spontaneous evolution. Except that the fœtus be very soft and premature, unusual conditions must be present that birth may occur. The pelvis must be especially roomy, pains unusually efficient and severe and reinforced by good abdominal muscles, and there must be but little resistance in the soft parts. Consequently, in the reported cases we find that either the mothers have had a number of easy births or have just given birth to a twin. The force of the pains may be judged from the frequency of fractures of the vertebra, the cranium, and the ribs of the fœtus. In 1905 Zickmond rightly stated that a careful reading of the cases reported as conduplicato corpore shows that they are, with very few exceptions, cases of spontaneous evolution. Franz, in 1910, after a very careful study, was able to collect only 14 undoubted conduplicato cases. In only three of these cases did the fœtus weigh more than 2,500 grams. Aside from the case which I report I have been able to add no other cases to this number. In Dubois' case the weight is not given, though the woman was said to be at term. The patient died at once of sepsis and hæmorrhage. In Adelman's case the fœtus, which weighed 3,900 grams, had a crushed cranium. Zickmond's case is especially interesting. A VII-para with the following measurements: 27 cm., 30.5 cm., 35 cm., 19 cm., conj. diagonalis 13 cm., gave birth, after a six-hour labor, to a freshly dead fœtus of from 3,750 to 4,000 grams, without tearing of uterus, cervix, or perineum, and had an uneventful puerperium. The vertebral column of the fœtus was broken. The case I have to report is as follows:

Mrs. —, Hungarian, 29 years old. Mother had twins. Menstrual history normal. Married 10 years; 5 pregnancies before the present one. The first miscarried at fifth month; digital removal of remnants. Four pregnancies followed in quick succession, all full-term spontaneous terminations, with normal puerperia. Children weighed between 6 and 7½ pounds. First labor lasted 12 hours, the others 3 hours or under. Midwife engaged each time, but was never there in time for delivery. Present pregnancy: Last menses October 10, 1910 (not sure). Was nauseated most of pregnancy, had frequent headaches, and during latter weeks had swollen ankles. Noticed that in latter weeks she was unusually large. First pains at 6 A.M. June 10, 1911. Birth of the first twin spontaneously at 9:30 A.M. Midwife arrived shortly afterwards. Four vaginal examinations by the midwife, without any attempt at cleanliness. The interne arrived at 10 A.M. and found uterine contractions of mild severity, an undelivered twin in transverse presentation with pulseless cord hanging from vagina; heart tones not audible. Maternal pulse 128, good and strong. Transport of patient to the Presbyterian Hospital, where she arrived at 11:50 A.M. Surgical preparation. At this time temperature was 100° F., pulse 126. Presenting at vulva was cord of second twin and placenta and cord of the first twin. Behind the placenta was the left arm of the second fœtus prolapsed into vagina, with shoulder wedged deep into pelvis, back anterior and head on the right side of the mother. Pains violent. While draping her preliminary to contemplated surgical delivery, patient had another unusually violent pain, and a dead boy was expelled from the vagina at 12:15 noon. The prolapsed arm and shoulder first appeared; then the head impressed into the abdomen of the child, followed by breech and legs. Patient began to bleed profusely, so that the placenta was removed manually from vagina and lower uterine segment and uterine cavity palpated for tears; the cervix was drawn into view, palpated and inspected. No tears were present except slight mucosa tear of the perineal region. Uterus packed and perineal tear repaired. Placentæ were separate. Mother's convalescence uneventful, except on afternoon of delivery and on evening of fourth day, when there was a sudden rise of short duration to 101° F.; the rest of the time temperature never over 99 F. On dismissal (twelfth day), uterus well involuted and in good position. First child, male; weight at birth 5 pounds 9 ounces, on dismissal 6 pounds 2½ ounces. Second child, stillborn male; weight 6 pounds; length 49 cm. The head was compressed laterally and the temporal and parietal bone on one side fractured. The mother's measurements taken on dismissal were: 26 cm., 31½ cm., 33 cm., 22+ cm. Promontory not reached.

The factors allowing the birth to occur were: Unusually roomy pelvis; multiparity; no resistance of soft parts because of birth of first twin; strong abdominal muscles; efficient strong pains. The fœtus was of medium size, had but recently died, and was consequently not pliable enough to pass with the skull undiminished in size.

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TRANSACTIONS OF SOCIETIES

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING HELD DECEMBER 20, 1912

DR. ARTHUR H. CURTIS. Dr. Watkins and I desire to report some specimens obtained at operation during the last few weeks. The first is a vaginal dermoid the size of a small orange which developed in the vaginal mucosa and protruded into the vaginal cavity in half of its extent. The tumor was located about 2 cm. to the left of the cervix. It was ulcerated and necrotic and contained sebaceous matter and considerable hair. The fact that there was no connection with the presacral or ischio-rectal spaces indicates that the tumor originated in the vagina and did not descend from either of these regions. Vaginal dermoids are of such rarity that but few have been recorded in the literature.

Three cases of tubal pregnancy are of interest because they occurred within such a short interval of time. One is microscopically worthy of your consideration because of its unusual richness in large syncytial cells.

A fifth and last case gave a history and findings negative in all respects except for pelvic pain and the presence of a moderately firm mass to the left of the uterus in the region of the tube. At operation large numbers of adhesions were found about the left tube and ovary. Enclosed in the adhesions and lying adjacent to the ovary was a recently formed clot of blood the size of a large hen's egg. At first glance it seemed that we had to do with a ruptured tubal pregnancy. Later examination, however, showed the tube to be absolutely normal. The ovary contained a large ruptured corpus luteum, the raw surface of which was in contact with the mass of blood. Sections through this region, which you may now observe under the microscope, demonstrate that this hæmorrhage is of corpus luteum origin. Cases of hæmorrhage from ruptured corpora lutea have been reported by Ries and others; their presence, however, is rarely diagnosed, despite the fact that they probably occur not infrequently.

DR. FRANK LYNCH read a paper entitled "Cervical Decidua Associated with Polypus, Causing Bleeding During Pregnancy." (See p. 694.)

DISCUSSION

Dr. J. CLARENCE WEBSTER: The occurrence of decidual reaction is an interesting topic for discussion. There can be no doubt that, normally, in the human female, it is a characteristic of the mucosa of the body of the uterus. That it may occasionally be found elsewhere in the Müllerian tract, viz., in the mucosa of the Fallopian tubes and of the cervix, is now well established. Dr. Lynch's case is an example of the latter formation.

Several years ago, while working at the anatomy of the uterus in pregnancy, I found that just as at the region of the os internum there was a gradual transition in the character of the glands of the mucosa, so there was in that of the connective tissue. In several cases decidual changes were found below the level of the os internum. It is not surprising, therefore, that polypoidal elevation of the cervical mucosa should also sometimes present these changes. The transverse sections exhibited by Dr. Lynch remind one of those found in cases of decidual transformation in the folds of the tubal mucosa. The connective tissue appears somewhat œdematous, the cells are enlarged, and the epithelium on the surface is altered from a columnar to a cubical or lower type.

As regards the development of decidual tissue outside the Müllerian tract, there must be much difference of opinion. In the ovary it is easy to explain on the hypothesis that detached portions of the tract may become embedded in the organ and may undergo the genetic reaction. It is possible that other tissues near the tubes and uterus may occasionally contain detached bits of Müllerian tissue.

I am not at all convinced that large cells occasionally described in the omentum and other structures are decidual. The flattened cells lining the peritoneum may under irritation multiply below the surface and form groups of large cells resembling decidual connective tissue cells.

There is no proof that pregnancy can cause a true genetic reaction in the connective tissue of the omentum or any other non-Müllerian tissue.

DR. SCHMAUCH: Dr. Lynch's case is that of a young woman pregnant for the first time, suffering from repeated hæmorrhage leading to abortion. Looking for the cause, the doctor found quite large polypous proliferations of the cervix, suggesting malignancy. The cervix is the usual place for such polypi to start. Besides, the microscope revealed a decidual change of the structures of these growths.

Dr. Lynch seems to be inclined to connect these findings with the miscarriage. However, as the ovum occupies that part of the uterus above the internal os, we would be more justified in assuming changes in the corpus uteri, or still better, some deficiency in the maternal organism, as the cause of the abortion. Even a cancer of the cervix or vaginal portion or a cervical fibroid are not sufficient to prevent normal pregnancy.

One of the few progressive facts that gynecology has produced in late years is Hitchmann and Adler's report of a constant periodical change in the uterine mucosa. These findings I value personally much more highly than all the operations devised during the past ten years for retroflexion and prolapse combined. Still, the profession has been slow to draw conclusions from these findings.

What I consider most important is the histological proof of a four weeks' periodicity in woman's life; consequently we have to change our views regarding menstruation. It is not the mere change in the histological structure of the uterine mucosa that brings on menstrual flow, causes bloody discharges from the uterus; it is rather a chemical change in the whole body of the woman. In order to bleed, woman's blood must undergo certain changes. If the blood did not lose its coagulability, the small lesions of the uterine mucosa would be insufficient to keep up the flow and the blood would coagulate before it left the uterus.

I do not desire to go into detail, but in my opinion this young woman lost her fœtus because her organism was not yet fit to stand the constant drain of mineral salts necessary to the building up of a child. This agrees with Dr. Lynch's finding of an abnormally anteflexed uterus. The small polypi and their decidual change I regard as mere accidentals.

We all agree that decidual changes in the cervix are rare.

Carl Ruge always pronounced the decidual cell as not typical of pregnancy; he knew the pictures of a menstrual decidua, and dysmenorrhoic membrane. The decidual cell is not a specific cell, as, for instance, the nerve or epithelial cell. It is the small stroma cell of the mucosa, of a connective tissue, that becomes enlarged and develops into the decidual cell. This name means nothing more than a transient condition of a cell similar to fatty degeneration, e. g. physiological and pathological changes.

Winter and also Webster want this trade-mark decidual cell reserved for the stroma cell of the uterine mucosa. Any other cell, connective tissue or mucosa cell, that undergoes the same changes and looks the same is not a decidual cell, but a decidua-like cell. This question of a name is hard to dispute, however; it assumes a different aspect if we ask ourselves, what leads to this temporary change in the cells. Everyone says it is the child, at least in pregnancy; an explanation for the decidual change in menstruation has not as yet been tried.

The influence of the growing child always had something mysterious for the gynecologist. Serial sections were made by the thousand; new stains were tried, but nothing was found. The plausible explanation given was that the decidual change facilitates the embedding and nourishment of the growing ovum. Not satisfied with these views, the theory of a poisoning of the maternal organism by the child was advanced, I do not know by whom, but it soon became common property. From the vomiting to the pigmentation and to eclampsia, everything was explained by toxæmia through the fœtus. This absurdity has kept gynecology and obstetrics at a complete standstill for the past ten years.

If a farmer puts his wheat in the ground, it takes away some fertility from the soil necessary to build up the wheat plant. Since he has no chance to make serial sections he does not talk about poisoning, but comes to the conclusion that the wheat robs his soil of certain elements. If you transmit this simple explanation to the pregnant woman, pregnancy and woman's life would be more easily understood. There is not much biological difference between the growing wheat and the growing ovum; both are robbing their soil, but not poisoning. The most important element in making up human and plant organisms is the lime. This same lime is what makes the nucleus of our cells so easy to stain with hæmatoxylin, because it contains calcium proteids. This same lime has to pass through the syncytium, so easy to stain, in order

to get to the fœtus. On account of the greater vitality of the fœtal organism, the latter takes its mineral elements wherever it can get them. The law of propagation is so severe that even the woman with cancer or tuberculosis can give life to a strong child. Her own organism suffers, succumbs to the disease; but the child thrives. The fœtus gets its supply of lime and other elements at first from the maternal blood; later on it will draw on the lime deposited in all the tissues. Lime is one of the main factors that enables blood to coagulate. If the loss of lime in the blood cannot be made up sufficiently, the woman is liable to bleed during pregnancy. Quite a number of young women lose their fœtus through constant hæmorrhage. Prolonged rest in bed and time, on the other hand, have helped to save the ovum in most desperate cases.

Now to come back to the decidual cells. Their main characteristic besides their size is the fact that their nucleus does not stain well, in direct opposition to the high affinity of the normal stroma cells to stain. Again, where do we find decidual cells? Dr. Lynch mentioned all of the places. They are always situated around blood and lymph vessels, in the pelvis, on all the roads that carry nourishment to the fœtus. This is the reason why Waldeyer proclaimed the perivascular origin of the decidual cell. In the same manner as we sometimes find the epithelial layer of the uterine glands undergo syncytial changes through chemical changes, the same influence of altered nourishment is liable to transform any connective tissue cell, not even muscle cells excepted, into decidual cells. But all these phenomena are not the result of a poisoning; they are in my opinion to be regarded as a temporary robbing or enriching in the original elements making up nucleus and protoplasm.

Dr. Walter C. Jones: The conclusion of Dr. Schmauch in regard to the fallacy of the theory of toxæmia of pregnancy may be correct. However, I object emphatically to the method of his reasoning by comparing the development of a fœtus in utero to the growth of a plant in the soil. In the first place, reasoning by analogy is fallacious. Secondly, he chose a very unfortunate subject for comparison, as far as establishing his point is concerned. For according to modern agricultural research, the theory has become pretty thoroughly established that plants in the process of their growth deposit toxins in the soil, so that after a few years any given plant has thus made the soil more or less inimical to its further growth. By counteracting these toxins the same plant may be made to grow on indefinitely in a soil which was originally suitable. This idea is not a mere hypothesis, but is a well-established theory based on abundant actual experimental evidence which has been produced at numerous state and federal agricultural experimental stations; and among scientific agriculturists this theory has almost displaced the old one that plants in the process of their growth abstract from the earth certain elements necessary for their growth and thus impoverish the soil. Hence it seems evident that if the doctor wishes to convince others that the theory of toxæmia of pregnancy is incorrect, he will not be able to do so through reasoning by analogy, especially if he selects such an unfortunate subject for comparison. I would suggest, on the other hand, that he present experimental and clinical evidence.

Dr. Walter C. Jones, by invitation, read a paper entitled, "Inversion of the Uterus; with a Report of a Case Occurring During the Puerperium and Caused by a Fibroid." (See p. 632.)

DISCUSSION

Dr. Dorland: I have had some experience in uterine inversion. It was my privilege to encounter what I believe to be one of the most remarkable obstetric cases ever experienced in Philadelphia. The patient was an elderly primipara, 34 years of age. The presentation was the first position of the chin. I expected to have an easy delivery, but after full dilatation of the os no descent occurred. Under ether I attempted to perform a cephalic version, but failed. Podalic version was then attempted but was found impos ible. Craniotomy was performed through the eye, but the head failed to collapse. Finally, by combined traction from below and pressure from above a very large fœtal monstrosity was delivered, the uterus immediately following it in a condition of complete inversion. I stripped off the placenta, mmediately re-inverted the fundus, and packed the cavity of the uterus with sterile gauze. An active hæmorrhage was taking place from a vestibular tear above the urethra. The bleeding joint was ligated and the tear sutured. Notwithstanding the prolonged labor with much digital exploration, attempts at version, the performance of craniotomy, inversion of the uterus, replacement of the fundus, and repair of a vestibular laceration, the puerperium was absolutely apyretic and recovery complete. The monstrosity was a case of iniencephalus or retroflexion of the fœtus, a very rare form of teratism, with solid union of the skull and spine as far as the lumbar region. Subsequently I assisted

Dr. Baer in an operation upon the wife of a farmer at Trappe, Pennsylvania, for the removal of a large sloughing uterine fibroid polyp which closely simulated uterine carcinoma in all its clinical manifestations. In the removal of this large polyp, which was about the size of a six months' fœtus, and which was attached to the uterine fundus, a partial inversion of the uterus occurred. This was replaced by a gauze-wrapped instrument without injury or further complications.

Dr. HERBERT M. STOWE: I have observed three instances of acute inversion of the uterus following delivery.

The first case was one in which the inversion occurred when the attending physician attempted to deliver the placenta by traction on the cord. There had been some bleeding in the third stage, and placental delivery was tried as a hæmostatic measure. One hour later, I found the uterus inverted and lying in the vagina. The placenta had been peeled off the uterine wall with resulting free bleeding. The woman was in shock; pulse 140, weak and thready. There was no free bleeding at this time. Absence of the fundus in its normal position was easily demonstrated. The parts were cleansed and covered with boric acid compresses and morphin administered. The following morning, some 18 hours later, an attempt to replace the organ was successful and the woman recovered promptly.

The second instance was evidently due to a violent effort to expel the placenta by the Credé method. Inversion was complete. There was little bleeding but the shock was marked. The placenta was partially detached before the accident occurred, and it was easily removed afterward. I saw this patient some two hours later, after several fruitless attempts to replace had been tried. An expectant treatment was recommended until the symptoms of shock had subsided, and the organ was replaced without much difficulty on the second trial.

The last inversion took place 14 days postpartum, and was due to straining at stool. The case is very similar to that reported by Ferré (*L'Obstêtrique*, March, 1905) where the inversion occurred 6 days post-partum from the same cause. This patient collapsed at once and had to be carried back to her bed. The fundus did not appear at the vulva, but the cup was plainly felt by abdominal palpation. Symptoms of shock disappeared within 12 hours, and the uterus was replaced under ether anæsthesia. The patient recovered.

In all these cases the utero-vaginal tract was tamponed with lysol gauze to prevent a recurrence of the accident.

During the stage of acute inversion, which is rarely fatal per se, I prefer to wait. If the patient appears to be bleeding to death a circular compression may be used. It is not advisable to operate during shock. The secondary shock may be sufficient to turn the scale against the patient. An analysis of 184 cases collected from the English literature supports this expectant treatment. The total mortality was 43, or 23.4 per cent. Of 79 cases in which the uterus was replaced in the presence of shock, 24, or over 30 per cent, died. In 23 cases in which shock did not exist, no deaths resulted. In 17 cases death occurred before the arrival of the physician, and was generally due to shock. In 45 cases in which the reposition was delayed until the condition was more or less chronic, reposition was effected without mortality.

The prompt recognition of a paresis of the placental site should make the physician cautious in delivering the placenta, for if this portion is drawn into the contraction ring, any muscular action will cause it to be inverted or reinverted according as it has or has not passed this point.

Dr. FRANK W. LYNCH: Like the last speaker I have also had two cases of inversion of the uterus, both of which were seen in consultation. The first was in the service of a midwife, who claimed that she had made no traction upon the cord, but that the uterus inverted shortly after the birth of the child, after a fit of coughing. She had removed the placenta before the arrival of the physician whom she had summoned to her assistance. I found surprisingly little bleeding but considerable shock. The uterus was replaced without difficulty by pressure immediately inside the cervix, and shortly after the correction of the deformity I was much surprised to find it balloon considerably above the navel, so that I was afraid to leave it without packing, although I hesitated on account of the danger of interfering with drainage in a case which threattened infection. I must also say I feared that reinversion would occur following removal of the gauze. Ergot was given in the hope of combating the shock, as well as with a view of obtaining uterine contractions.

The second case undoubtedly followed vigorous expression of the placenta in the hands of an able-bodied physician. He acknowledged that pressure had been made when the fundus was not firm, and that suddenly the uterus seemed to disappear from his fingers. This patient lost considerable blood and went into profound and

immediate shock. The inversion in this case was not as complete as the other, and like it was easily reduced by taxis. No packing was used, nor did it appear necessary, as the case presented no subsequent complication. I neglected to state that the placenta, part of which was not separated, was removed during the efforts at replacement.

DR. RUDOLPH W. HOLMES: The subject of inversion of the uterus is one which has interested me for years, since I had my first patient with this rare complication. The existence of a fundal fibroid of a polypoid character causing an inversion is of more interest in its gynecologic aspect than in its obstetric relation. So far as I can recall in my investigations preparatory to writing my paper on inversion of the uterus, no instance of inversion due to fibroid occurred in immediate relation to the puerperium, so this case of Dr. Jones stands out as an unique one. There can be no question, however, that, granted the existence of a fundal polyp, the gynecologic inversion would be more likely to occur in relation to the puerperium than later, for the large softened uterus with a relaxed cervix would predispose to the descent of the fibroid, which would drag the fundus with it.

In times past it had aroused much discussion why a primipara was peculiarly prone to inversion; this stands out clearly when we realize that primiparous labors bear a relation to multiparous ones as one to three or four; in my statistics, of 333 cases 68 per cent occurred after first labors. My own impression is that the explanation lies in a faulty innervation or maldevelopment of the uterine musculature, or both. Contributory to this is the rather constant presence of the fundal placental site.

I believe all will bear me out that shock is rarely seen after obstetric operations; as my memory goes now I can hardly recall a fully developed instance of shock after delivery. On the other hand, shock is one of the most frequent, and in general the most characteristic, symptoms of the presence of inversion. This is in rather sharp contrast to the surprisingly slight hæmorrhages which may accompany the trouble. This is explained by the fact that contractions of the third stage are absent, therefore the placenta is firmly adherent to its site; on the other hand, the great pull on the ovarian vessels and disturbance, at least, of the uterine vessels minimize this danger.

We cannot lay down any hard and fast rules as to whether the placenta should be removed before or after reposition; in the main, I believe removal after reposition is more desirable and safer, for it prevents the exposure of the placental site in great measure to contamination. Secondly, the removal of the placenta may irritate the uterus to contraction, which may seriously compromise the return. On the other hand, the placenta attached may prevent the ready return of the uterus, from the mere bulk of the mass.

In the days of the late Nicholas Senn we heard much of the *furor operativus* which held too many surgeons. The numerous operative procedures outlined by Dr. Jones, and they are but a very few of the many methods of operative correction, incline me to believe that most of the operations suggested are brought forward to exploit the wonderful ingenuity of the originator rather than any particular call for their need. Painstaking conscientious attempts at taxis will secure a return in by far the majority of cases. You may recall that many years ago the late Dr. White of London had a case where taxis failed; the next morning amputation was to be done, but during the night spontaneous reposition took place. This has occurred not so rarely, and possibly may be explained on the hypothesis of a reversal of the vicious contractions. Not so long ago I had a woman who had gone between two and three weeks in her puerperium, with a recognized inversion. Under anæsthesia taxis seemed futile, even though continued for a protracted period; just as the announcement was made that it was useless to continue, the fundus snapped back into its normal position. It is axiomatic that the knife should never be used until repeated attempts at manual revision have failed.

There are two facts that must be borne in mind in manual reposition: one, that that part which came down last, i. e. the cervico-uterine wall, must be returned first; by this procedure two layers of uterine wall are passed through the cervical canal while if the fundus is attempted first you have four layers. Secondly, it is well to direct the force of the pressure to either ilio-sacral fossa, thereby escaping the hindrance of the promontory.

To recapitulate: Immediate reposition; brisk bimanual massage (the internal hand being within the uterine cavity); when contractions are secured, then manual removal of the placenta, and then Credé of the hand and placenta—never withdraw the hand with the contained placenta without Credé; then immediate utero-vaginal tamponade. This last, to prevent recurrence, is so essential that I would wish this society could put itself on record that, from this day forth, anyone who reposed an inverted uterus and did not use the tamponade was culpable.

COLLEGE OF SURGEONS

Report of Meeting for Organization Held in Washington, May 5, 1913

AN American College of Surgeons was organized at a meeting in Washington on Monday evening, May 5, 1913. Four hundred and fifty prominent surgeons of the continent of North America came together at the invitation of an Organization Committee which was appointed by the Clinical Congress of Surgeons of North America at its meeting in November, 1912. This committee consisted of Edward Martin of Philadelphia, Emmet Rixford of San Francisco, John B. Murphy of Chicago, Rudolph Matas of New Orleans, Albert J. Ochsner of Chicago, Charles H. Mayo of Rochester, Minn., Frederic J. Cotton of Boston, George Emerson Brewer of New York City, J. M. T. Finney of Baltimore, W. W. Chipman of Montreal, George W. Crile of Cleveland and Franklin H. Martin of Chicago.

The invitations, which resulted in this large gathering of surgeons in Washington, were extended by the Organization Committee after a carefully prepared campaign in which each large university city on the continent was visited by a member of the committee who met, in person, a group of selected men brought together by a committee of three in each locality, which committee had been authorized by the Organization Committee to extend an invitation to the surgeons in their locality to meet the representative of the Organization Committee. These five hundred men who were invited to the meeting in Washington, four hundred and fifty of whom responded, represented all branches of surgery and surgical specialities. The surgeons responding to the invitation were designated as the Founders of the College.

FOUNDERS' MEETING

At this meeting in Washington, called for the purpose of effecting an organization, the Committee on Organization presented a definite tentative plan, which plan included a call of the meeting, the presentation of by-laws, the presentation of resolutions, and a plan for the completion of the organization by the election of governing bodies and executive officers.

CALL OF THE MEETING

The men were called together by Edward Martin, Chairman of the Organization Committee, who asked for the reading of the Call.

The Call of the Meeting was read by Franklin H. Martin, Secretary of the Committee. This call, which is herein quoted in part, summarizes the work for which the Committee was authorized:

"First, It should formulate a minimum standard of requirements which should be possessed by any authorized graduate in medicine who is allowed to perform, independently, surgical operations in general surgery or any of its specialties.

"Second, It should consider the desirability of listing the names of those men who desire to practice surgery and who come under the authorized requirements.

"Third, It should seek the means of legalizing under national, colonial, state or provincial laws, a distinct degree supplementing the medical degree, which shall be conferred upon physicians possessing the requirements recognized by this law as necessary to be possessed by operating surgeons.

"Fourth, It should seek co-operation with the medical schools of the continent which have the right to confer the degree of M. D., under the present recognized standards, and urge these colleges to confer a supplementary degree on each of its graduates who have, in addition to their medical course, fulfilled the necessary apprenticeship in surgical hospitals, operative laboratories, and actual operative surgery.

"Fifth, It should authorize and popularize the use of this title by men upon whom it is conferred, and its use should especially be urged in all directories of physicians in order that the laity as well as medical men can distinguish between the men who have been authorized to practice surgery and those who have not.

"The net result of the Committee's efforts is that five hundred surgeons of all specialties, representing every large center of population, every important university city with a teaching faculty of medicine, every special and general society representing a speciality of surgery, all the important surgical clinics and hospitals, besides many independent surgeons from all portions of the North American continent, have consented to become founders of the organization under contemplation, and of this five hundred fully four hundred and fifty are here at this hour ready to fulfill their obligation."

The Founders' Organization was then com-

pleted by the election of Edward Martin as Chairman and Franklin H. Martin as Secretary, and the authorization of an order of business

BY-LAWS

The interest in the by-laws centered in: (1) The Name, (2) The Object, (3) The Formation of the Organization, (4) Its Administrative Plans, (5) The Meaning of the Fellowships, (6) Fees, (7) Directory, (8) Expulsion, (9) Standing Committees.

I. NAME. The name of the corporation is the College of Surgeons.

II. OBJECT. The object of the College shall be to elevate the standard of surgery, to provide a method of granting fellowships in the organization and to formulate a plan which will indicate to the public and the profession that the surgeon possessing such a fellowship is especially qualified to practice surgery as a speciality.

III. ORGANIZATION. The corporation is to be known as the College. The College shall consist of all members of the corporation, to be known as Fellows, and shall vest the general management of the corporation in a Board of Governors, and the Board of Governors shall in turn vest the details of the management in a board of trustees, to be known as the Board of Regents.

IV. ADMINISTRATIVE PLANS. The Board of Governors shall consist of the five hundred surgeons invited by the Organization Committee to serve as founders of the College and who have signified their willingness to act in that capacity. The members of the first Board of Governors shall also be known as the founders of the College of Surgeons.

This original Board of Governors shall be divided into three classes to serve one, two and three years. At the annual meeting in 1914 and at each succeeding annual meeting, the Fellows of the College shall elect fifty surgeons to membership in the Board of Governors, each for a term of three years. Thirty of these are to be elected from a list of nominations consisting of two members each nominated by the following surgical societies and associations of North America:

American Surgical Association, Section on Surgery of the American Medical Association, Section on Obstetrics, Gynecology and Abdominal Surgery of the American Medical Association, General Surgical Division of the Clinical Congress of Surgeons of North America, Division of Surgical Specialties of the Clinical Congress of Surgeons of North America, American Gynecological Society, Southern Surgical and Gynecological Association, Western Surgical Association, Section on Surgery of the Canadian Medical Association, American Association of Obstetricians and Gynecologists, American Orthopedic Association, American Association of Genito-Urinary Surgeons, American Laryngological Society, American Ophthalmological Society, American Otological Society.

Twenty members shall be elected at large to represent surgeons of North America not affiliated with the above societies or associations.

The Board of Regents shall consist of twelve surgeons, members of the Board of Governors, elected by the Governors, these to be divided into three classes whose terms of service shall expire in one, two and three years. Their successors shall be elected each for a term of three years. Not more than three of each class of four shall be elected from one country. The Board of Regents is increased to fifteen in number by three officers of the Corporation, the President, Treasurer and General Secretary. The two Vice-Presidents are ex-officio members of the Board. The Board of Regents is the administrative body of the corporation, corresponding to a board of trustees in other corporations.

V. FELLOWSHIPS. The Fellows of the College shall be graduates in medicine who are legalized to practice medicine in their states and provinces, who have made an application for fellowship, such application to be endorsed by three Fellows of the College, one of whom shall be a member of the Board of Governors, and who meets the qualification requirements that shall, from time to time, be established by the Board of Regents, and who shall be elected to fellowship by the Board of Regents on recommendation of the Committee on Credentials.

Each Fellow of the College shall be designated a Fellow of the College of Surgeons and shall be authorized and encouraged to use the letters F. C. S. after his name on professional cards, in professional directories, and in scientific articles published in surgical literature.

VI. FEES. An initial fee of twenty-five dollars shall be required of each member of the College on his election to fellowship by the Board of Regents. The annual dues will be five dollars.

VII. DIRECTORY. The Board of Regents shall issue each year a directory containing the names and addresses of the Fellows of the College of Surgeons, arranged by states, provinces and colonies.

VIII. EXPULSION. Any member of the College may be expelled for unprofessional or other conduct inconsistent with the rules and regula-

tions of this corporation by a majority vote of the Board of Regents.

IX. STANDING COMMITTEES. The Board of Regents shall elect the following standing committees: (1) Credentials, (2) Legislation, (3) Graduate Schools and Hospitals.

These by-laws were unanimously adopted with the provision that the Board of Regents should make any minor corrections deemed desirable and present such corrections for adoption at the next meeting of the Board of Governors.

OFFICERS ELECTED

President, J. M. T. Finney, Maryland; First Vice-President, W. W. Chipman, Quebec; Second Vice-President, Rudolph Matas, Louisiana; Treasurer, A. J. Ochsner, Illinois; General Secretary, Franklin H. Martin, Illinois.

BOARD OF REGENTS

J. M. T. Finney, Maryland; A. J. Ochsner, Illinois; Franklin H. Martin, Illinois; George E. Brewer, New York; George E. Armstrong, Quebec; John B. Murphy, Illinois; Edward Martin, Pennsylvania; F. J. Cotton, Massachusetts; Herbert A. Bruce, Ontario; C. F. Stokes, Washington, D. C.; William D. Haggard, Tennessee; George W. Crile, Ohio; Robert E. McKechnie, British Columbia; Charles H. Mayo, Minnesota; Harry M. Sherman, California.

SELECTION OF FELLOWS

Much interest was manifested in the method to be pursued in the selection of the members of the corporation and in the method of conferring fellowships. A series of resolutions covering this subject was offered by the Secretary and adopted.

The prospective Fellows are to be divided into four classes: A, B, C, and D. Classes A, B, and C are by resolution to be admitted without the formality of submitting to an examination under the following resolution:

"RESOLVED, That the A class shall consist of the founders of the College.

"The B class shall consist of the members of the special surgical societies constituting the Congress of American Physicians and Surgeons, and one hundred each, nominated by accredited committees, from the Section on Surgery of the American Medical Association, from the section on Obstetrics, Gynecology and Abdominal Surgery of the American Medical Association, from the General Surgical Section of the Clinical Congress of Surgeons of North America, from the Division of Surgical Specialties of the Clinical Congress of Surgeons of North America, from the American Association of Obstetricians and Gynecologists, from the Surgical Section of the Canadian Medical Association, from the Southern Surgical and Gynecological Association and from the Western Surgical Association.

"The C class shall consist of surgeons of prominence of five years in the practice of surgery or a surgical specialty and who, in the opinion of the Committee on Credentials, are eligible for fellowship in the College without formal examination."

For all others, coming under class D, the following resolution was passed:

"BE IT FURTHER RESOLVED, That the Board of Regents, through the Committee on Credentials, limit the admission of Fellows to classes A, B, and C until the Board of Regents formulates a standard of requirements for class D and reports the recommendations back to the Board of Governors for approval at the meeting to be called by the Board of Regents in Chicago, November, 1913."

It will be the spirit of this association to open the fellowship to all competitors in surgery without favor. Scientific attainments, surgical ability, unquestioned moral character, measured by the College's standards, shall constitute the measure for fellowship.

There are many hundreds of surgeons on the continent, who are not included in classes A and B, who fall into the C class. Applications from these men will be welcome and their names will have the most careful consideration by the Committee on Credentials.

All applications for membership should be forwarded to the Secretary of the corporation. It would add to the ease of the work of the Committee on Credentials if references in the way of vouchers or recommendations from one or more well-known surgeons accompany each application for fellowship.

FORMAL CONFERRING OF FELLOWSHIP

The first convocation for the formal conferring of fellowships will occur in November, 1913, at a time and place that will be designated later. The first directory of Fellows will be distributed at that meeting. For that reason the applications for fellowships by men in A, B, and C classes should be filed as promptly as possible in order to facilitate the correcting of lists for publication.

ON MEMBERSHIP IN THE COLLEGE OF SURGEONS

By FRANKLIN H. MARTIN, M. D., General Secretary

Since the organization meeting of the College of Surgeons of America, many inquiries have been received as to the method of procedure required to attain fellowship in this organization.

To the fifteen surgeons comprising the Board of Regents, representing territorially all sections of the North American continent, has been intrusted the delicate task of formulating a membership plan, to include the reception of applications for membership and the final election to fellowship in the College of those fulfilling the standard of requirements. The founders of the College conferred upon the Board of Regents almost unlimited freedom of action in carrying out this preliminary work.

While it is true that three classes of surgeons were declared eligible to election to fellowship in the College immediately, the resolutions dealing with each of these classes provided that each individual thus named shall be confirmed by the Regents before he can be formally declared a Fellow of the College.

These three groups include the surgeons and men practicing surgical specialties who have been in the practice of their specialty for a considerable length of time and who are recognized as surgeons of established reputation. They are divided for convenience into three classes: Class A, men who were chosen to organize the College by the Committee on Foundation; Class B, surgeons who are members of one of the fifteen national organizations of surgeons and surgical specialties which are designated as constituent societies; Class C, surgeons of prominence not included in Class A and not affiliated with any of the societies represented in Class B.

For Class D, which will include all other candidates, namely, young men recently graduated in medicine who wish to practice surgery as a specialty, and men who have been in the practice of medicine for a longer period and are desirous of developing a surgical specialty, a special committee of the Board of Regents is carefully preparing a standard of requirements for admission, and this plan will be presented for the approval of the Governors at the November meeting.

Of the A, B, C and D classes of members, the first three classes will be subject to consideration during the next six months, and while the men in these classes have been declared eligible to immediate membership, the Board of Regents has taken measures to subject these names to the same careful scrutiny that will be employed in the selection of members from Class D.

No man will come before the Board of Regents for final election to fellowship until the applicant has made a formal statement in writing that he is desirous of becoming a member, such application to be accompanied by the membership fee.

Surgeons representing Classes A, B, and C will receive notice that they are eligible under the by-laws, and on request will be sent blanks upon which they can make their applications.

Surgeons who come under Class D, and in this class is included all legalized practitioners who are desirous of becoming members, will be furnished blanks by the Secretary upon which they may make their applications, which in due time will be carefully considered by the Board of Regents.

It is the desire of the present Board of Regents to establish the precedent that any applicant for fellowship in the College will receive the fullest consideration.

Finally, when a surgeon's original application has been passed upon favorably by the Committee on Credentials, he will be sent a fellowship blank upon which he may make his declaration of acceptance of the principles of the College, together with such other data and information as the Regents may require as a matter of record. The applicant will then be duly elected by the Board of Regents a Fellow of the College of Surgeons of America.